

Systems

OS/VS Virtual Storage Access Method (VSAM) System Information

Program Number 5741-020

Feature Numbers 5005
5006
5403
5404

Program Number 5742-016

Feature Numbers 5009
5010
5407
5408

IBM

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This is a reprint of GC26-3835-0 incorporating changes released in technical newsletter GN26-0769 (dated July 16, 1973).

This edition, as amended by technical newsletter GN26-0769, applies to the release of OS/VS Virtual Storage Access Method (VSAM) as an independent component of OS/VS2. Numbers that apply for OS/VS1 (Program Number 5741-020) are:

Number	Meaning
5005	Basic material; 800 bits-per-inch, 9-track tape
5006	Basic material; 1600 bits-per-inch, 9-track tape
5403	Optional material; 800 bits-per-inch, 9-track tape
5404	Optional material; 1600 bits-per-inch, 9-track tape

The Feature Numbers that apply for OS/VS2 (Program Number 5742-016) are:

Number	Meaning
5009	Basic material; 800 bits-per-inch, 9-track tape
5010	Basic material; 1600 bits-per-inch, 9-track tape
5407	Optional material; 800 bits-per-inch, 9-track tape
5408	Optional material; 1600 bits-per-inch, 9-track tape

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PREFACE

This publication provides information on how to incorporate OS/VS Virtual Storage Access Method (VSAM) into an OS/VS system. It also contains information that temporarily supplements other OS/VS publications.

This publication has the following major divisions:

- “Distribution Tape,” which describes the VSAM distribution tape.
- “Installation Procedure,” which describes how to install VSAM in OS/VS.
- “Storage Estimates,” which provides the information needed to estimate the amount of storage required for VSAM and for Access Method Services, the multifunction service program that supports VSAM.
- “System Management Facilities Information,” which describes the records written by VSAM to the SMF data set and describes the space required for VSAM SMF records.
- “Checkpoint/Restart Information,” which describes the checkpoint/restart support for VSAM.
- “Messages and Codes,” which lists and explains the messages issued by VSAM and Access Method Services and shows the routing and descriptor codes associated with VSAM messages.

Required Publications

The following publications are required for use with the publication you are now reading:

- *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3818, which provides a complete description of the macro instructions used to code a program to process a VSAM data set.
- *OS/VS Access Method Services*, GC35-0009, which provides a complete description of the commands used to define, delete, load, and alter a VSAM data set.

Related Publications

This publication supplements information presented in the following publications:

- *OS/VS Checkpoint/Restart*, GC26-3784
- *OS/VS Message Library: VS1 System Codes*, GC38-1003
- *OS/VS Message Library: VS2 System Codes*, GC38-1008
- *OS/VS Message Library: Routing and Descriptor Codes*, GC38-1004
- *OS/VS Message Library: VS1 System Messages*, GC38-1001
- *OS/VS Message Library: VS2 System Messages*, GC38-1002
- *OS/VS System Management Facilities (SMF)*, GC35-0004
- *OS/VS1 Storage Estimates*, GC24-5094
- *OS/VS2 Storage Estimates*, GC28-0604



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DISTRIBUTION TAPE

The distribution tape for the independent component release of OS/VS Virtual Storage Access Method (VSAM) is an unlabeled 9-track tape, written at either 800 or 1600 bit bits per inch, depending on which was ordered. The distribution tape consists of four files, as follows:

- File 1, which contains the definition of a user macro instruction, which, when assembled, produces the job stream required to apply the independent component to the system and/or distribution libraries.
- File 2, which contains modules to be loaded into distribution and system libraries.
- File 3, which contains macro definitions to be loaded into distribution and system libraries.
- File 4, which contains link-edited modules, which are combinations of distribution-library modules, to be loaded into system libraries, and contains individual distribution library modules for Feature Number 5005 or 5006. It also contains ICRSCR, a program used to scratch any members found in system or distribution libraries to be updated that have the same name as modules or macro definitions on the distribution tape.

The modules contained in file 2 of the distribution tape are:

IDAIIFBF	IDCCDAL	IDCTSR10	IGG0CLAV
IDAIIIPM1	IDCCDCP	IDCTSTP0	IGG0CLAW
IDAIIIPM2	IDCCDDE	IDCTSTP1	IGG0CLAX
IDAIIIPM3	IDCCDDL	IDCTSUV0	IGG0CLAY
IDAIIISM1	IDCCDLC	IDCTSXP0	IGG0CLAZ
IDA019C1	IDCCDMP	IDCXP01	IGG0CLA1
IDA019RA	IDCCDPM	IDCVY01	IGG0CLA6
IDA019RB	IDCCDPR	IEFAB410	IGG0CLA7
IDA019RC	IDCCDVY	IEFAB411	IGG0CLA8
IDA019RD	IDCCDXP	IEFNB902	IGG0CLBA
IDA019RE	IDCDB01	IEHDDOIO	IGG0CLBB
IDA019RF	IDCDB02	IEHDDUMP	IGG0CLBC
IDA019RG	IDCDE01	IEHDEXCP	IGG0CLBD
IDA019RH	IDCDL01	IEHDREST	IGG0CLBE
IDA019RI	IDCEX02	IFG0191X	IGG0CLBF
IDA019RJ	IDCEX03	IFG0191Y	IGG0CLBG
IDA019RK	IDCIO02	IFG0192A	IGG0CLBH
IDA019RL	IDCIO03	IFG0193A ¹	IGG0CLBJ
IDA019RM	IDCLC01	IFG0200N	IGG0CLBK
IDA019RN	IDCMP01	IFG0200V	IGG0CLBL
IDA019RO	IDCPM01	IGC0A05B	IGG0CLBM
IDA019R1	IDCPR01	IGC0B05B	IGG0CLBN
IDA019R2	IDCRIKT	IGC0C06C	IGG0CLBP
IDA019R3	IDCRILT	IGC0002C ²	IGG0CLBQ
IDA019R4	IDCRI01	IGC0006H ²	IGG0CLBR
IDA019R5	IDCRI02	IGC0102G	IGG0CLBS
IDA019R6	IDCRI03	IGG0CLAB	IGG0CLBT
IDA019R7	IDCRP01	IGG0CLAC	IGG0CLBU
IDA019R8	IDCSA01	IGG0CLAD	IGG0CLBV
IDA019R9	IDCSA02	IGG0CLAE	IGG0CLBW
IDA0192A	IDCSA03	IGG0CLAF	IGG0CLBX
IDA0192C	IDCSA05	IGG0CLAG	IGG0CLBY
IDA0192G	IDCTP01	IGG0CLAH	IGG0CLB3
IDA0192I	IDCTP04	IGG0CLAJ	IGG0CLB6
IDA0192P	IDCTP05	IGG0CLAK	IGG0CLB8
IDA0192S	IDCTSAL0	IGG0CLAL	IGG0CLCA
IDA0192V	IDCTSDEO	IGG0CLAM	IGG0CLCB
IDA0192W	IDCTSDL0	IGG0CLAN	IGG0CLCC
IDA0192Z	IDCTSEX0	IGG0CLAP	IGG0CLC9
IDA0200S	IDCTSI00	IGG0CLAQ	IGG019P9
IDA0200T	IDCTSLC0	IGG0CLAR	IHJARS60 ²
IDA0231T	IDCTSLC1	IGG0CLAS	IMDUSRF9
IDA0557A	IDCTSMP0	IGG0CLAT	
IDCAL01	IDCTSPR0	IGG0CLAU	

¹ This module is not included when Feature Number 5009 or 5010 is ordered.

² This module is not included when Feature Number 5005 or 5006 is ordered.

The macros and sample program contained in file 3 of the distribution tape are:

CHECK ¹	IDACB2	IDATEST	SGIDC401
ENDREQ	IDAELEM	IMPORT	SHOWCB
ERASE	IDAERMAC	MODCB	TESTCB
GENCB	IDAGENC	POINT ¹	VERIFY
GET ¹	IDAMODC	PUT ¹	VSAMPGEX
IDACB1	IDASHOW	SGIDA401	

¹ This module is not included when Feature Number 5005 or 5006 is ordered.

File 4 of the distribution tape includes ICRSCR and the following link-edited modules, which are combinations of distribution modules: IDA019L1, IDA0192A, IGG0CLC9, and IDCAMS. When Feature Number 5005 or 5006 is ordered, file 4 also contains:

IDAIIFBF	IDA019RD	IFG0191Y	IGC0102G
IDAIIPM1	IDA019RN	IFG0192A	IGG0CLAL
IDAIIPM2	IDA019R6	IFG0200N	IGG0CLCA
IDAIIPM3	IDA019R7	IFC0A05B	IGG0CLCB
IDAIIISM1	IDA019R9	IGC0B05B	IGG0CLCC
IDA019C1	IFG0191X	IGC0C06C	IGG019P9



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INSTALLATION PROCEDURE

This chapter describes the procedure for installing VSAM in a VS1, Release 2, or VS2, Release 1.6, system.

Installation Requirements

Before VSAM can be installed in your system, you must verify that there is enough room in your libraries to accommodate VSAM modules. Figure 1 shows the space and directory blocks required in each library to be updated. It also shows the physical record size (BLKSIZE) and record format (RECFM) for each library. The installation procedure assumes that all data sets were preallocated. The LPALIB and SVCLIB libraries, shown in the figure, apply to VS2, release 1.6, and to VS1, release 2, respectively.

Library Name	Space (in tracks)	Directory Blocks	Physical Record Size	Record Format
	2314/3330/2305-2		2314/3330/2305-2	
AOSA0	90/45/45	25	6144/6144/6144	U
AOSB3	4/2/2	2	6144/6144/6144	U
AOSD0	5/3/3	2	6144/6144/6144	U
AOS12	4/2/2	2	6144/6144/6144	U
AOS6C	1/1/1	1	6144/6144/6144	U
AOSU0	60/30/30	20	6144/6144/6144	U
AMACLIB	50/30/25	5	6800/6800/6800	FB
ASAMPLIB	30/15/15	2	6800/6800/6800	FB
GENLIB	10/5/5	2	6800/6800/6800	FB
MACLIB	50/30/25	5	7200/13030/14660	FB
LINKLIB	60/35/30	20	7200/13030/14660	U
LPALIB	70/40/35	10	7200/13030/14660	U
SVCLIB	70/35/35	10	2048/2048/2048	U

Figure 1. VSAM Space Requirements in System and Distribution Libraries

Space in AOS6C, which is shown in Figure 1, is required only when VSAM is to be installed in an OS/VS2 system.

Note: A minimum of two megabytes of virtual storage is required for a VS system that includes VSAM. In an OS/VS1 system, a minimum of three megabytes of virtual storage is required for VSAM, the standard SVC list, and the RAM list. (VSAM requires 220K bytes of storage in the RAM list.) Any additional entries on the resident SVC or RAM list will require additional virtual storage. See *OS/VS1 Storage Estimates*, GC24-5094, for information about how to determine virtual storage requirements.

The installation procedure follows:

1. Determine which installation macro instruction variables are applicable to your installation's needs. See "Installation Macro Instruction" later in this chapter for a complete description of the installation macro instruction. If you plan to update only distribution libraries on a starter system, you must allocate space for the new distribution libraries and catalog them. If you plan to update distribution libraries on your production system, you must allocate space for the new distribution libraries and must catalog *all* distribution libraries identified in Figure 1.

2. Code the job control language (JCL) and installation macro instruction to be used to install VSAM in your VS1 or VS2 system. See “Coding JCL and the Installation Macro” later in this chapter for a description of the JCL and the location of the installation macro instruction in the job stream.
3. Mount the distribution tape.
4. Run the job. The first step of the job copies file 1 from the distribution tape to SYSUT2; file 1 contains the definition of the installation macro. The second step of the job expands the installation macro instruction and produces an output job stream.
5. Start a reader to read the output produced in step 4. This output is itself a job stream that contains the job control language required to load VSAM modules into system libraries, distribution libraries, or both, as you specified when you coded the installation macro instruction.

Note: Do not update system libraries on the running system. In a single-system environment, you may copy the system libraries and update the copies.

If you are adding VSAM to a VS1 system and coded VSAM=EXCLUDE in the CTRLPROG macro instruction in the previous system generation, (1) perform steps 1 through 5, updating distribution libraries only, and (2) perform another system generation to include VSAM. See *OS/VS1 System Generation Reference*, GC26-3791, and *OS/VS2 System Generation Reference*, GC26-3792, for a full description of the CTRLPROG macro instruction.

Installation Macro Instruction

The installation macro instruction is used to define the variables that pertain to the installation of VSAM. The format of the installation macro instruction is:

CRxxxx	[CRTAPE={9/800 9/1600},] [CRUNIT={uuuu 2400},] [IOSUP={YES NO},] WK1UNIT=uuuu, WK1VOL=vvvvvv, [WK2UNIT=uuuu, WK2VOL=vvvv,] [LINKLIB=([uuuu],[vvvv],[YES NO], [SYS1.LINKLIB dsname]),] [MACLIB=([uuuu],[vvvvvv],[YES NO], [SYS1.MACLIB dsname]),] [{SVCLIB LPALIB}=([uuuu],[vvvvvv],[YES NO], [SYS1.SVCLIB SYS1.LPALIB dsname]),] [UPDATE={DLIBS SYSTEM BOTH},] [PREFIX=pppp,] REL=VSAM
---------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

where:

CRxxxx

is the name of the installation macro instruction, which must not begin in column 1. The values that can be coded for xxxx are as follows:

5005

specifies that the distribution tape is written at a density of 800 bits per inch and applies to a VS1 system.

5006

specifies that the distribution tape is written at a density of 1600 bits per inch and applies to a VS1 system.

5009

specifies that the distribution tape is written at a density of 800 bits per inch and applies to a VS2 system.

5010

specifies that the distribution tape is written at a density of 1600 bits per inch and applies to a VS2 system.

[CRTAPE={9/800 | 9/1600}]

is an optional parameter that specifies the track and density of the distribution tape. If no value is coded, 9/800 is the default.

[CRUNIT={uuuu | 2400}]

is an optional parameter that specifies the unit on which the distribution tape is to be mounted. If CRUNIT is not coded, 2400 is the default.

[IOSUP={YES | NO}]

is an optional parameter that specifies whether the IEHIOSUP utility program is to be run against the SVCLIB library. This parameter is only used when VSAM is being installed in a VS1 system and SYSTEM or BOTH was coded in the UPDATE parameter. If this parameter is not coded and VSAM is to be installed in a VS1 system, YES is the default.

WK1UNIT=uuuu, WK1VOL=vvvvv

are required parameters that identify a direct-access unit and volume to be used for work space. The uuuu may be a device name, the actual device address, or a generic name; vvvvv is the volume serial number.

[WK2UNIT=uuuu, WK2VOL=vvvvv]

are optional parameters that identify a second direct-access unit and volume to be used for work space. The uuuu may be a device name, the actual device address, or a generic name. If these parameters are not specified, values for WK2UNIT and WK2VOL will be the same as for WK1UNIT and WK1VOL. You may expect better performance when work space is divided between volumes.

[LINKLIB=([uuuu],[vvvvv],[YES | NO],[SYS1.LINKLIB | dsname])]

is an optional parameter that specifies that a LINKLIB data set is to be updated with modules from the distribution tape. The data set identified in this parameter must not be the LINKLIB for the running system. This parameter is not used when DLIBS is coded or accepted as the default in the UPDATE parameter. The values that are coded for this parameter are as follows:

uuuu, vvvvv

specifies the unit (uuuu) and volume (vvvvv) on which the LINKLIB data set resides. If unit and volume information is omitted, the LINKLIB data set is located through the system catalog.

YES | NO

specifies whether the link library is to be compressed before the library is updated. If no value is coded, NO is the default.

SYS1.LINKLIB | *dsname*

specifies the name of the link library. If no value is coded, SYS1.LINKLIB is the default. If an alternate name is coded, space for the data set must have been allocated.

[**MACLIB**=(*[uuuu]*,*[vvvvvv]*),**[YES | NO]**,**{SYS1.MACLIB | *dsname*}**]

is an optional parameter that specifies that the MACLIB data set is to be updated with modules from the distribution tape. The data set identified in this parameter must not be the MACLIB for the running system. This parameter is not used when DLIBS is coded in the UPDATE parameter. The values that are coded for this parameter are as follows:

uuuu,*vvvvvv*

specifies the unit (*uuuu*) and volume (*vvvvvv*) on which the MACLIB data set resides. If unit and volume information is omitted, the MACLIB data set is located through the system catalog.

YES | NO

specifies whether the macro library is to be compressed before the library is updated. If no value is coded, YES is the default.

SYS1.MACLIB | *dsname*

specifies the name of the macro library. If no value is coded, SYS1.MACLIB is the default. If an alternate name is coded, space for the data set must have been allocated.

[**{SVCLIB | LPALIB}**=(*[uuuu]*,*[vvvvvv]*),**[YES | NO]**,**[SYS1.SVCLIB | SYS1.LPALIB | *dsname*)]**]

is an optional parameter that specifies that the SVCLIB or LPALIB data set is to be updated with modules from the distribution tape. The data set identified in this parameter must not be the SVCLIB or LPALIB for the running system. This parameter is not used if DLIBS is coded in the UPDATE parameter. The values that are coded for this parameter are as follows:

SVCLIB

specifies that VSAM is to be installed in a VS1 system and that the SVCLIB data set is to be updated.

LPALIB

specifies that VSAM is to be installed in a VS2 system and that the LPALIB data set is to be updated.

uuuu,*vvvvvv*

specifies the unit (*uuuu*) and volume (*vvvvvv*) on which the SVCLIB or LPALIB data set resides. If unit and volume information is omitted, the system catalog is used to find the SVCLIB or LPALIB data set.

YES | NO

specifies whether the SVCLIB or LPALIB library is to be compressed before the data set is updated. If no value is coded, NO is the default. (Note: if SYS1.SVCLIB is to be compressed, the unmovable indicator in the DS1DSORG field (bit 7, offset 82) of the DSCB must be turned off.) For information on how to do this, see *OS/VS Service Aids*, GC28-0633.

SYS1.SVCLIB | SYS1.LPALIB | *dsname*

specifies the name of a data set to be updated. If no value is coded, SYS1.SVCLIB or SYS1.LPALIB is the default. If an alternate name is coded, space for the data set must have been allocated.

[UPDATE={DLIBS | SYSTEM | BOTH}]

is an optional parameter that specifies the type of update to be performed. The values that can be specified are as follows:

DLIBS

specifies that only distribution libraries are to be updated. If you intend to perform another system generation to include VSAM, code DLIBS. If UPDATE is not coded, DLIBS is the default. If DLIBS is coded or accepted as the default, do not code the LINKLIB, MACLIB, and SVCLIB or LPALIB parameters.

SYSTEM

specifies that system libraries are to be updated. If you want to include VSAM in a system and do not anticipate performing another system generation until necessary to install a subsequent release, code SYSTEM. When SYSTEM is coded, you must also code the LINKLIB, MACLIB, and SVCLIB or LPALIB parameters to identify the data sets to be updated; these data sets must not be the system libraries used on the running system.

BOTH

specifies that distribution libraries and system libraries are to be updated. If you want to include VSAM in a system but anticipate performing another system generation before installing a subsequent release, code BOTH. By coding BOTH, you make VSAM modules available in distribution libraries for future system-generation procedures. If BOTH is coded, you must also code the LINKLIB, MACLIB, and SVCLIB or LPALIB parameters to identify the data sets to be updated; these data sets must not be the system libraries used on the running system.

[PREFIX=*pppp*]

is an optional parameter that specifies the prefix (first level) of the distribution library names. If you specify DLIBS or BOTH in the UPDATE parameter (or do not code the UPDATE parameter and accept the default, DLIBS), PREFIX is required.

REL=VSAM

is a required parameter that specifies that the independent component being added to your system is VSAM.

Coding JCL and the Installation Macro

Figure 2 shows the job control language and macro instruction used to install VSAM in a VS1 or VS2 system.

The COPYMACS step in USERJOB1 causes file 1 from the distribution tape, which contains the installation macro instruction, to be copied to SYSUT2.

The ASMPARMS step in USERJOB1 causes the definition of the installation macro instruction to be expanded by the assembler. The figure shows the JCL required to punch the assembled macro out on cards; the output could also, however, be directed to a tape or direct-access volume.

```

//USERJOB1      JOB User job card parameters
//COPYMACS      EXEC PGM=IEBUPDTE,PARM=NEW
//SYSPRINT      DD DUMMY
//SYSUT2        DD UNIT=SYSDA,DSN=8&CRIN,DISP=(NEW,PASS),
//              SPACE=(CYL,(2,1,5)),DCB=(LRECL=80,
//              RECFM=FB,BLKSIZE=1680)
//SYSIN         DD UNIT=2400,DISP=(OLD,KEEP),
//              VOLUME=SER=CRTAP,LABEL=(1,NL),
//              DCB=(LRECL=80,RECFM=FB,BLKSIZE=800,DEN=2)1
//ASMPARMS      EXEC ASMF,PARM.ASM='DECK,NOLOAD,LINECNT=52'1
//ASM.SYSLIB    DD DISP=(OLD,DELETE),DSN=8&CRIN
//ASM.SYSPUNCH  DD SYSOUT=B2
//ASM.SYSIN     DD DATA
//              REPRO3
//USERJOB2      JOB User job card parameters
//              CRxxxx User parameters4
//              END
/*

```

¹ For 800 bits-per-inch density tape, code DEN=2; for 1600 bits-per-inch density tape, code DEN=3.

² Output can also be directed to either a tape or direct-access volume.

³ Multiple REPRO instructions can be used for either additional job card continuations or JOBLIB cards to specify where IBM utility programs reside. See "Controlling the Assembler" in OS/VS and DOS/VS Assembler Language, GC33-4010, for a description of the REPRO instruction.

⁴ The name of the installation macro instruction depends on the density at which the distribution tape is written and on the system (VS1 or VS2) to which it applies.

Figure 2. Job Control Language Required for Installation Procedure

The ASM.SYSIN DD statement identifies the remainder of the statements as input. The REPRO instruction causes the statement that follows, USERJOB2, to be reproduced. You start a reader to read the output created in the ASMPARMS step.

USERJOB2 executes the job stream created in the ASMPARMS step in USERJOB1. This job stream causes:

- The distribution package to be copied from the distribution tape to a work volume.
- The ICRSCR program, which deletes members that have the same name as modules or macro definitions on the distribution tape, to be executed.
- The libraries to be updated to be compressed, if requested or accepted as a default, and distribution modules and macros to be copied from the work unit to the libraries to be updated.
- The distribution package to be scratched from the work volume.

Examples

The examples in the topics that follow show the installation macro instruction used to update system libraries in a VS1 system, to test VSAM in a VS1 system before updating system libraries, to update system and distribution libraries in a VS2 system, and to update distribution libraries only in a VS1 system.

Example 1

In this example, system libraries are to be updated in a VS1 system. This example assumes that VSAM=INCLUDE was coded in the CTRLPROG macro instruction in the last system generation.

The example follows:

```
//USERJOB1      JOB User job card parameters
//COPYMACS      EXEC PGM=IEBUPDTE,PARM=NEW
//SYSPRINT      DD DUMMY
//SYSUT2        DD UNIT=SYSDA,DSN=*&CRIN,DISP=(NEW,PASS),
//              SPACE=(CYL,(2,1,5)),DCB=(LRECL=80,
//              RECFM=FB,BLKSIZE=1680)
//SYSIN         DD UNIT=2400,DISP=(OLD,KEEP),
//              VOLUME=SER=CRTAP,LABEL=(1,NL),
//              DCB=(LRECL=80,RECFM=FB,BLKSIZE=800,DEN=3)
//ASMPARMS      EXEC ASMFC,PARM.ASM='DECK,NOLOAD,LINECNT=52'
//ASM.SYSLIB     DD DISP=(OLD,DELETE),DSN=*&CRIN
//ASM.SYSPUNCH   DD SYSOUT=B
//ASM.SYSIN      DD DATA
//              REPRO
//USERJOB2      JOB User job card parameters
//              CR5006      CRTAPE=9/1600,CRUNIT=2400,
//                          IOSUP=YES,
//                          WK1UNIT=SYSDA,WK1VOL=222222,
//                          UPDATE=SYSTEM,REL=VSAM,
//                          SVCLIB=(2314,RESVOL,YES,SYS1.SVCLIB),
//                          LINKLIB=(2314,RESVOL,YES,SYS1.LINKLIB),
//                          MACLIB=(2314,RESVOL,YES,SYS1.MACLIB)
//              END
/*
```

The installation macro, CR5006, specifies that the distribution tape is written at a density of 1600 bits per inch and applies to a VS1 system.

The parameters are discussed below:

- CRTAPE identifies the distribution tape as a 9-track tape, written at a density of 1600 bits per inch. Note that DEN=3, which indicates a density of 1600 bits per inch, is coded in the SYSUT2 DD statement.
- CRUNIT identifies the unit on which the distribution tape is to be mounted.
- IOSUP specifies that the IEHIOSUP utility program is to be run against the SVCLIB library. Because system libraries are being updated and VSAM is being installed in a VS1 system, YES must be coded if IOSUP is specified.
- WK1UNIT and WK1VOL identify the unit and volume to be used for work space. Because WK2UNIT and WK2VOL are not specified, the values for WK1UNIT and WK1VOL are used.
- UPDATE specifies that only system libraries are to be updated from the distribution tape.
- SVCLIB, LINKLIB, and MACLIB specify that the system libraries (SYS1.SVCLIB, SYS1.LINKLIB, and SYS1.MACLIB) reside on a 2314 volume with a volume serial number of RESVOL. The system libraries are to be compressed before they are updated. The system libraries identified by these statements are not the system libraries for the running system.

- REL=VSAM specifies that VSAM is the independent component that is being added to the VS1 system.

When the job stream resulting from this example reaches end-of-job, VSAM is installed in the VS1 system. Note, however, that distribution libraries are not updated; VSAM does not reside on distribution libraries from which it can be pulled into a new system by a subsequent system generation.

Example 2

In this example, system libraries are to be updated in a VS1 system. This example assumes that VSAM=INCLUDE was coded in the CTRLPROG macro instruction in the last system generation. Alternate LINKLIB and MACLIB data sets are to receive VSAM modules so that VSAM can be tested on the system before SYS1.LINKLIB and SYS1.MACLIB are modified. SYS1.SVCLIB, however, is to be updated directly from the distribution tape. Only the installation macro instruction variables are shown in this example.

The example follows:

```
CR5006      CRTAPE=9/1600,CRUNIT=2400,      *
            IOSUP=YES,                      *
            WK1UNIT=SYSDA,WK1VOL=222222,    *
            SVCLIB=( 2314,LIB0,YES,SYS1.SVCLIB), *
            LINKLIB=( 2314,LIB1,,SYS1.LINK), *
            MACLIB=( 2314,LIB2,NO,SYS1.MAC), *
            UPDATE=BOTH,PREFIX=SYST,REL=VSAM
```

The installation macro, CR5006, specifies that the distribution tape is written at a density of 1600 bits per inch and applies to a VS1 system.

The parameters are discussed below:

- CRTAPE identifies the distribution tape as a 9-track tape, written at a density of 1600 bits per inch.
- CRUNIT identifies the unit on which the distribution tape is to be mounted.
- IOSUP specifies that the IEHIOSUP utility program is to be run against the SVCLIB library.
- WK1UNIT and WK1VOL identify the unit and volume to be used for work space. Because WK2UNIT and WK2VOL are not specified, the values for WK1UNIT and WK1VOL are used.
- SVCLIB, LINKLIB, and MACLIB identify the units and volumes on which system libraries reside. SYS1.SVCLIB resides on LIB0, which is a 2314 volume. LINKLIB resides on LIB1, which is a 2314 volume. The LINKLIB data set, SYS1.LINK, will not be compressed. MACLIB resides on LIB2, which is a 2314 volume. Because NO is coded, the data set will not be compressed before modules from the distribution tape are added to it. The name of the MACLIB data set is SYS1.MAC. The system libraries identified by these statements are not the system libraries for the running system.
- UPDATE specifies that both system and distribution libraries are to be updated from the distribution tape.
- PREFIX specifies that the prefix to be used for the distribution libraries is "SYST".

- REL=VSAM specifies that VSAM is the independent component that is being added to the VS1 system.

When the job stream shown in this example reaches end-of-job, VSAM modules and macros are installed in distribution libraries, in SVCLIB library, and in alternate LINKLIB and MACLIB data sets for testing. Testing can be done by concatenating SYS1.LINKLIB and SYS1.MACLIB with the SYS1.LINK and and SYS1.MAC data sets.

When you are satisfied with the test results, install VSAM by (1) copying the alternate data sets to the system data sets, or (2) performing another installation procedure and specifying SYSTEM in the UPDATE parameter.

Example 3

In this example, system and distribution libraries are to be updated in a VS2 system. Only the installation macro instruction variables are shown in this example.

The example follows:

```
CR5010      CRTAPE=9/1600,CRUNIT=2400,          *
            WK1UNIT=SYSDA,WK1VOL=333333,        *
            WK2UNIT=SYSDA,WK2VOL=444444,        *
            SVCLIB=( 2314,RESVOL,YES,SYS1.SVCLIB), *
            LINKLIB=( 2314,RESVOL,YES,SYS1.LINKLIB), *
            MACLIB=( 2314,RESVOL,YES,SYS1.MACLIB), *
            UPDATE=BOTH,PREFIX=SYS1,REL=VSAM
```

The installation macro, CR5010, specifies that the distribution tape is written at a density of 1600 bits per inch and applies to a VS2 system.

The parameters are discussed below:

- CRTAPE identifies the distribution tape as a 9-track tape, written at a density of 1600 bits per inch.
- CRUNIT identifies the unit on which the distribution tape is to be mounted.
- WK1UNIT and WK1VOL identify the unit (SYSDA) and volume (333333) to be used for work space.
- WK2UNIT and WK2VOL identify a unit (SYSDA) and volume (444444) to be used for work space. Because the values specified are not the same as those specified for WK1UNIT and WK1VOL, the work will be split between volumes.
- SVCLIB, LINKLIB, and MACLIB identify the unit (2314) and volume (RESVOL) on which the system libraries reside. The system libraries are to be compressed before they are updated. The system libraries identified by these statements are not the system libraries for the running system.
- UPDATE specifies that both system libraries and distribution libraries are to be updated with modules from the distribution tape.
- PREFIX specifies that the prefix to be used for distribution libraries is "SYS1".
- REL specifies that the independent component being added to the VS2 system is VSAM.

When the job stream that includes this installation macro instruction reaches end-of-job, VSAM is installed in the VS2 system. Both distribution and system libraries are updated; therefore, VSAM is available on distribution libraries to be pulled into the system by a subsequent system generation.

Example 4

In this example, the distribution libraries are to be updated in a VS1 system. After the distribution libraries are updated, it will be necessary to perform a system generation to include VSAM in the VS1 system; the system-generation process will cause the system libraries to be updated from the distribution libraries. Only the installation macro instruction variables are shown in this example.

The example follows:

```
CR5005      CRTAPE=9/800                      *  
            WK1UNIT=SYSDA,WK1VOL=22222,        *  
            UPDATE=DLIBS,PREFIX=VSAM,REL=VSAM
```

The installation macro, CR5005, specifies that the distribution tape is written at a density of 800 bits per inch and applies to a VS1 system.

The parameters are discussed below:

- CRTAPE identifies the distribution tape as a 9-track tape, written at 800 bits per inch. Because CRUNIT is not coded, 2400 is the default.
- WK1UNIT and WK1VOL identify the unit and volume to be used for work space. Because WK2UNIT and WK2VOL are not coded, the values specified for WK1UNIT and WK1VOL are used; this means that the work is not split between volumes.
- UPDATE specifies that only distribution libraries are to be updated with modules from the distribution tape. Because DLIBS is coded, LINKLIB, MACLIB, and SVCLIB parameters are not coded.
- PREFIX specifies that the prefix to be used for distribution libraries is "VSAM".
- REL specifies that VSAM is the independent component being added to the VS1 system.

When the job stream that includes this installation macro instruction reaches end-of-job, distribution libraries are updated, but VSAM is not installed in the VS1 system. The distribution libraries updated as a result of this example are:

```
VSAM.AOSA0  VSAM.AOSD0  VSAM.AOS12  VSAM.AGENLIB  
VSAM.AOSB3  VSAM.AOSU0  VSAM.AMACLIB VSAM.ASAMPLIB
```

To complete the installation of VSAM, perform a system generation and code VSAM=INCLUDE in the CTRLPROG macro instruction.

Library Status After Installation

The members contained in each updated library are listed in the topics that follow.

SVCLIB/LPALIB Library

The modules that are contained in the SVCLIB or LPALIB library after VSAM is installed are:

AMDUSRF9 ¹	IDA019R6	IFG0200N	IGC0002C ⁷
IDAIIFBF	IDA019R7	IFG0200V ⁵	IGC0006H ⁷
IDAIIIPM1	IDA019R9	IGC0A05B	IGC0102G
IDAIIIPM2	IDA0192A ²	IGC0B05B	IGG0CLA1
IDAIIIPM3	IFG0193A ³	IGG0CLCA	IGG0CLC9
IDAIIISM1	IDA109RN	IGG0CLCB	IGG019P9
IDA019C1	IFG0191X	IGC0C06C	
IDA019L1	IFG0191Y	IGC0V05B ⁷	
IDA019RD	IFG0192A ⁴	IGC0002F ⁶	

¹ This module (AMDUSRF9 or HMDUSRF9) is called IMDUSRF9 when AOS12 is updated.

² The alias names associated with IDA0192A are IDA0192G, IDA0192I, IDA0192P, IDA0192V, IDA0200S, IDA0200T, IDA0231T, and IDA0557A.

³ This module is not included when Feature Number 5009 or 5010 is ordered.

⁴ The alias names associated with IFG0192A are IFG0192I, IFG0200S, IFG0200T, IFG0231T, and IFG0557A.

⁵ This module is not added to LPALIB, that is, this module is not included when Feature Number 5009 or 5010 is ordered.

⁶ This module, IGC0002F, is called IGG0CLCL when AOSU0 is updated.

⁷ This module is not included when Feature Number 5005 or 5006 is ordered.

MACLIB Library

The macro definitions that will be contained in the MACLIB library are:

CHECK ¹	IDACB1	IDAMODC	POINT ¹
ENDREQ	IDACB2	IDASHOW	PUT ¹
ERASE	IDAELEM	IDATEST	SHOWCB
GENCB	IDAERMAC	IMPORT	TESTCB
GET ¹	IDAGENC	MODCB	VERIFY

¹ This module is not included when Feature Number 5005 or 5006 is ordered.

LINKLIB Library

The modules that will be contained in the link library are:

HMDUSRF9	IDCDE01	IDCRP01	IDCTSTP1
IDCAL01	IDCDL01	IDCSA05	IDCTSUV0
IDCAMS	IDCEX02	IDCTP04	IDCTSXP0
IDCCDAL	IDCEX03	IDCTP05	IDCVY01
IDCCDCP	IDCIO02	IDCTSAL0	IDCXP01
IDCCDDE	IDCIO03	IDCTSDE0	IEFAB410
IDCCDDL	IDCLC01	IDCTSDL0	IEFAB411
IDCCDLC	IDCMP01	IDCTSEX0	IEFVAMP
IDCCDMP	IDCPM01	IDCTSID0	IEHDDOIO
IDCCDPM	IDCPR01	IDCTSLC0	IEHDDUMP
IDCCDPR	IDCRIKT	IDCTSLC1	IEHDEXCP
IDCCDVY	IDCRILT	IDCTSMP0	IEHDREST
IDCCDXP	IDCRI01	IDCTSPR0	
IDCDB01	IDCRI02	IDCTSRIO	
IDCDB02	IDCRI03	IDCTSTP0	

GENLIB Distribution Library

The macro definitions that will be contained in the GENLIB library are:
SGIDC401 and SGIDA401.

Sample Library

The sample library will contain VSAMPGEX.

AOSA0 Distribution Library

The following modules are loaded into AOSA0 when distribution libraries are updated:

IDAIIFBF	IDA019R7	IGG0CLAE	IGG0CLBD
IDAIIPM1	IDA019R8	IGG0CLAF	IGG0CLBE
IDAIIPM2	IDA019R9	IGG0CLAG	IGG0CLBF
IDAIIPM3	IDA0192A	IGG0CLAH	IGG0CLBG
IDAIIISM1	IDA0192C	IGG0CLAJ	IGG0CLBH
IDA019C1	IDA0192G	IGG0CLAK	IGG0CLBJ
IDA019RA	IDA0192I	IGG0CLAL	IGG0CLBK
IDA019RB	IDA0192P	IGG0CLAM	IGG0CLBL
IDA019RC	IDA0192S	IGG0CLAN	IGG0CLBM
IDA019RD	IDA0192V	IGG0CLAP	IGG0CLBN
IDA019RE	IDA0192W	IGG0CLAQ	IGG0CLBP
IDA019RF	IDA0192Z	IGG0CLAR	IGG0CLBQ
IDA019RG	IDA0200S	IGG0CLAS	IGG0CLBR
IDA019RH	IDA0200T	IGG0CLAT	IGG0CLBS
IDA019RI	IDA0231T	IGG0CLAU	IGG0CLBT
IDA019RJ	IDA0557A	IGG0CLAV	IGG0CLBU
IDA019RK	IFG0191X	IGG0CLAW	IGG0CLBV
IDA019RL	IFG0191Y	IGG0CLAX	IGG0CLBW
IDA019RM	IFG0192A	IGG0CLAY	IGG0CLBX
IDA019RN	IFG0200N	IGG0CLAZ	IGG0CLBY
IDA019RO	IGC0A05B	IGG0CLA1	IGG0CLB3
IDA019R1	IGC0B05B	IGG0CLA6	IGG0CLB6
IDA019R2	IGC0C06C	IGG0CLA7	IGG0CLB8
IDA019R3	IGC0102G	IGG0CLA8	IGG0CLC9
IDA019R4	IGG0CLAB	IGG0CLBA	
IDA019R5	IGG0CLAC	IGG0CLBB	
IDA019R6	IGG0CLAD	IGG0CLBC	

AOSD0 Distribution Library

The module contained in AOSD0 is IFG0200V.

AOSU0 Distribution Library

The modules that will be contained in AOSU0 are:

IDCAL01	IDCEX01	IDCRP01	IDCTSMP0
IDCCDAL	IDCEX02	IDCSA01	IDCTSPR0
IDCCDCP	IDCEX03	IDCSA02	IDCTSRIO
IDCCDDE	IDCIO01	IDCSA03	IDCTSTP0
IDCCDDL	IDCIO02	IDCSA05	IDCTSTP1
IDCCDLCL	IDCIO03	IDCTP01	IDCTSUV0
IDCCDMP	IDCLC01	IDCTP04	IDCTSXP0
IDCCDPM	IDCMP01	IDCTP05	IDCVY01
IDCCDPR	IDCPM01	IDCTSAL0	IDCXP01
IDCCDVY	IDCPR01	IDCTSDEO	IEHDDOIO ¹
IDCCDXP	IDCRIKT	IDCTSDL0	IEHDDUMP ¹
IDCDB01	IDCRILT	IDCTSEX0	IEHDEXCP ¹
IDCDB02	IDCRI01	IDCTSIO0	IEHDREST ¹
IDCDE01	IDCRI02	IDCTSLC0	IGG019P9 ¹
IDCDL01	IDCRI03	IDCTSLC1	

¹ These modules are added to the AOSU0 distribution library only when Feature Number 5005 or 5006 was ordered.

AOSB3 Distribution Library

The modules contained in the AOSB3 library are: IEFAB410, IEFAB411, and IEFNB902.

AOS6C Distribution Library

The module contained in AOS6C when Feature Number 5009 or 5010 ordered in IHJARS60.

AOS12 Distribution Library

The module contained in AOS12 is IMDUSRF9.



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STORAGE ESTIMATES

Storage is required for VSAM and Access Method Services in addition to storage required for OS/VS. See *OS/VS1 Storage Estimates*, GC24-5094, and *OS/VS2 Storage Estimates*, GC28-0604, for OS/VS estimates.

Note: VSAM is a system generation option for OS/VS1; VSAM is not a system generation option for OS/VS2.

Virtual Storage

Virtual storage is required in the pageable supervisor or link-pack area and in the user's address space for VSAM.

Pageable Supervisor/Link-Pack Area

VSAM routines reside in pageable virtual storage. The minimum virtual storage that can be specified when VSAM is included in the system is 2048K bytes. If VSAM was specified at system generation, the minimum virtual storage must also have been specified. If VSAM was not specified at system generation, you must perform system generation to include VSAM in the system.

When the resident type 3 and 4 SVC routine option is selected, the total storage required for all type 3 and 4 SVCs is used to calculate the size of the pageable supervisor. For complete information on this topic, see "Appendix A" in *OS/VS1 Storage Estimates*, GC24-5094, and *OS/VS2 Storage Estimates*, GC28-0604, with the following exceptions for OS/VS1 when VSAM is used:

- To the total size of DADSM modules, add 1100 bytes for IGG0102G, the module that obtains VSAM space for VSAM data spaces.
- Change the size of IGC0002F, a catalog-management module, from 1024 bytes when VSAM is not used to 1400 bytes when VSAM is used.
- To the catalog-management modules, add: IGG0CLA1 catalog PSA loader, 300 bytes; IGG0CLCA, OS/VS catalog request handler, 1350 bytes; and IGG0CLCB, VSAM catalog request handler, 1350 bytes.
- From open executors for QISAM only, remove IGG01923, Load (scan mode) and (VLR), 1024 bytes.

Figure 3 shows the VSAM load modules and transients that are resident in the SVCLIB or LPALIB library; they are loaded into the pageable supervisor or link-pack area by nucleus initialization (NIP) at initial program load (IPL).

To calculate the size of the pageable supervisor or link-pack area, you must have the size of the access-method modules that may be resident in any configuration when the resident reenterable load module option is selected. For complete information on this topic, see "Appendix B" in *OS/VS1 Storage Estimates*, GC24-5094, and *OS/VS2 Storage Estimates*, GC28-0604. When VSAM is included in your system, 239,663 bytes is the total storage required for VSAM's resident reenterable modules. Note that the VSAM modules are loaded when the IBM-supplied standard list IEAIGG00 is used.

Name		Description	Size (in bytes)
Catalog Management			
IGG0CLC9	SL	Catalog-management routines	122,000
Control Block Manipulation			
IDA019C1	SL	Control block manipulation	4,830
Record Management			
IDA019L1	SL	Main record management	45,000
IDA019R6	SL	Channel/abnormal end	1,700
IDA019R7	SL	I/O asynchronous routine	1,300
IDA019R9	SL	Start I/O page-fix appendage	2,000
IDA019RN	SL	PCI appendage	8
Checkpoint/Restart			
IGC0C06C	SL	Checkpoint	735
IGC0A05B	SL	First restart	1,625
IGC0B05B	SL	Second restart	1,125
Open/Close/End-of-Volume			
IDA0192A	SL	Open/close/end-of-volume	59,000
VSAM Transients			
IFG0192A		VSAM open/close/end-of-volume loader	1,024
IFG0191X		VSAM catalog open ACB processor, load 1	2,048
IFG0191Y		VSAM catalog open ACB processor, load 2	2,048
IFG0200N		VSAM catalog close/end-of-volume ACB processor	2,048

Figure 3. VSAM Load Modules and Transients That Are Resident in the SVCLIB or LPALIB Library

User's Address Space

Although most of the storage required for VSAM is in the pageable supervisor or link-pack area, additional storage is required in the user's address space for control blocks, buffers, Access Method Services, and, if used, the ISAM interface routines and attendant control blocks.

Access Method Services Requirements

Access Method Services, which runs as a processing program, requires a minimum of 67K bytes of storage for Access Method Services modules, control blocks, and buffers.

Figure 4 shows the Access Method Services load module list for VSAM; these modules are loaded into the user's address space.

Module Name	Description	Size (in bytes)
IDCAL01	Alter FSR	5,350
IDCAMS	Root module	25,450
IDCCDAL	Command descriptor for ALTER	1,400
IDCCDCP	Command descriptor for REPRO	1,900
IDCCDDE	Command descriptor for DEFINE	9,000
IDCCDDL	Command descriptor for DELETE	600
IDCCDLC	Command descriptor for LISTCAT	600
IDCCDMP	Command descriptor for IMPORT	800
IDCCDPM	Command descriptor for PARAMETER	500
IDCCDPR	Command descriptor for PRINT	1,250
IDCCDVY	Command descriptor for VERIFY	50
IDCCDXP	Command descriptor for EXPORT	600
IDCCP01	Copy FSR	2,400
IDCDB01	Debug module (dump)	1,500
IDCDB02	Debug module (symbolic dump)	2,500
IDCDE01	Define FSR	14,700
IDCDL01	Delete FSR	2,400
IDCEX02	Processor initialization	450
IDCEX03	Processor termination	650
IDCIO02	Command descriptor modules table search	9,000
IDCIO03	Reader/interpreter command termination	2,000
IDCLC01	LISTCAT FSR	11,750
IDCMP01	IMPORT FSR	10,400
IDCPM01	PARAMETER FSR	1,850
IDCPR01	PRINT FSR	2,600
IDCRILT	Load module name table	650
IDCRI01	Reader/interpreter main line	22,650
IDCRI02	Command-descriptor modules table search	1,650
IDCRI03	Reader/interpreter command termination	1,300
IDCSA05	Get date and time of day	700
IDCTP04	Initialize and modify PCT	4,200
IDCTP05	Read text structures into storage	1,150
IDCTSDE0	Text structure for DEFINE FSR	400
IDTSDL0	Text structure for DELETE FSR	200
IDCTSEX0	Text structure for executive routines	1,000
IDCTSIO0	Text structure for I/O adapter routines	1,200
IDCSLC0	Text structure for LISTCAT FSR	5,000
IDCTSMP0	Text structure for IMPORT FSR	750
IDCTSPR0	Text structure for PRINT FSR	1,000
IDCTSRIO	Text structure for reader/interpreter routines	3,000
IDCTSTP0	Text structure for text processor routines	1,300
IDCTSTP1	Text structure for text processor routines	400
IDTSUV0	Text structure for any routine (universal)	500
IDTSXP0	Text structure for EXPORT FSR	450
IDCVY01	VERIFY FSR	950
IDCXP01	EXPORT FSR	6,700

Figure 4. Access Method Services Load Modules

Catalog-Management Requirements

Figure 5 shows how to estimate virtual storage in the user's address space for catalog-management control blocks. The figure is organized according to types of requests for services. For example, if a LOCATE request is to be satisfied, 4096 bytes are required. It is further organized according to optional features that can be used with VSAM. For example, for a LOCATE request with the user-security verification record (USVR), 4096 + 325 bytes are required.

Request	Size (in bytes)	Size with SMF	Size with USVR
LOCATE	4,196		325
UPDATE	4,196	$1,672 + 512H + 1,024J$	
UPDATE EXTEND	4,708	$1,672 + 512H + 1,024J$	
DEFINE	$5,767 + 95V + (375K - 250)R$	$100 + 512H$	325
DEFINE SPACE	4,984		325
DEFINE NonVSAM	4,524		325
DEFINE CATALOG	13,564		
ALTER	13,784	$1,672 + 512H + 1,024J$	
DELETE	$4,656 + 20P + 128$	$142 + 512H$	
DELETE SPACE	4,524		325
DELETE CATALOG	4,524		
LIST CATALOG	4,524		325
Open, Close, or Extend a User Catalog	588		

H— The number of catalog records that describe the catalog record being processed.

J— The number of records that are modified.

K— The number of key ranges.

P— The number of extents in the catalog.

R— A value of 2 for a key-sequenced data set when the sequence set is with the data; otherwise, a value of 1.

V— The number of candidate volumes.

Figure 5. Estimating Space in the User's Address Space for
Catalog-Management Control Blocks

Record-Management Requirements

The record-management portion of VSAM requires storage in the user's address space for control blocks, buffers, and optional modules.

Buffers are required for data and index control intervals. The size of the buffers is dictated by control-interval size. A minimum of two buffers is required for each data component; a minimum of one buffer is required for

each index component. For example, a data component with a control-interval size of 2048 bytes and an index with a control-interval size of 512 bytes requires a minimum of 4096 bytes for the data component and 512 bytes for the index component, or a total of 4608 bytes of buffer space. When you manage your own buffers, only one buffer each is allowed for the data and index component.

If Generalized Trace Facility (GTF) is used, 3000 bytes is required.

If DD DUMMY job control statements are used with VSAM data sets, 900 bytes is required.

If checkpoint/restart is used with VSAM data sets, the checkpoint/restart work area must be increased by 216 bytes.

Space is required for control blocks created by Open. The control blocks created by Open and the means for estimating their size are:

- AMBL (Access Method Block List), which has a length, in bytes, equal to $52 + 4N$, where the value of N is 0 for a dummy data set, 1 for a data or index component, or 2 for a cluster.
- DDEB (Dummy Data Extent Block), which has a length of 56 bytes.
- AMB (Access Method Block), which has a length of 80 bytes. The number of AMBs created by Open depends on what is opened: if a dummy data set is opened, the number is 0; if a data or index component is opened, the number is 1; and if a cluster is opened, the number is 2.
- AMDSB (Access Method Data Statistics Block), which has a length of 152 bytes. There is one AMDSB for each AMB.
- Insert Work Area, the length of which depends on whether a data or index component was opened in create or non-create mode. For a data component, regardless of mode, the DIWA (Data Insert Work Area) has a length of 48 bytes. For an index component in create mode, three ICWAs (Index Create Work Areas) are required. For an index component in non-create mode, one IMWA (Index Manipulation Work Area) and one ICWA are required. The length, in bytes, of an ICWA is $56 + 3K$, rounded up to a multiple of 8, where K is the key length. The IMWA has a length, in bytes, of $76 + 3K$, rounded up to a multiple of 8, where K is the key length.
- BUFC (Buffer Control Block), the length of which depends on whether a data or index component was opened. For a data component:

$$16 + 28(A + B)$$

rounded up to a multiple of 8, where A is the number of data buffers; and B is the number of preformat buffer-control entries (a preformat buffer-control entry is not associated with a buffer, but is associated with a channel program area). For an index component:

$$16 + 28(A + B)$$

rounded up to a multiple of 8, where A is the number of index buffers; B is 0 for input only processing, or 1 for input and output processing.

- IOB (Input/Output Block), the length of which depends on whether a data or index component was opened. For a data component:

$$N(120 + 8A)$$

where A is the total number of data buffers plus 1, minus the number of places VSAM is to keep track of in the data set, and N is the number of places VSAM is to keep track of in the data set.

For an index component:

$128N$

where N is the number of places VSAM is to keep track of in a data set. The value of N, for both data and index components, comes from either the JFCAMSTR field or the ACBSTRNO field in the ACB. If both these fields are 0, N is set equal to 1.

- ARDB (Address Range Definition Block), the number of which depends on whether the data is divided into key ranges. When the data is not divided into key ranges, one ARDB is required for the data component; one ARDB is required for the index component when the sequence set is not with the data, and two ARDBs are required when the sequence set is with the data. When the data is divided into key ranges, one ARDB is required for each key range of the data component; one is required for the index component when the sequence set is not with the data, and one plus one for each key range is required when the sequence set is with the data. The size of an ARDB is calculated as follows:

$29 + 2K$

rounded up to a multiple of 4, where K is the key length. The total space for all ARDBs is equal to the size of a single ARDB, multiplied by the number of ARDBs, rounded up to a multiple of 8.

- PLH (Placeholder), which has a length, in bytes, equal to $4 + AB$, where A is the number of places VSAM is to keep track of in a data set. The A value comes from either the JFCAMSTR field or the ACBSTRNO field in the ACB. If both fields are 0, A is set equal to 1. B is equal to 224 plus key length, rounded up to a multiple of 4.
- EDB (Extent Definition Block), which has a length, in bytes, equal to $8 + 20E$, rounded up to a multiple of 8, where E is the number of extents in the component opened.
- DEB (Data Extent Block), which has a length, in bytes, equal to $80 + 16E$, where E is the number of extents in the component.
- CPA (Channel Program Area), used for buffers. The size of the CPA for each buffer is calculated as follows:

$88 + 8(A + B + C + D) + 2E + F$

where:

A

is $4(\text{number of physical records per control interval}) + 2$ for format write or $3(\text{number of physical records per control interval})$ for update write. For an RPS device, increase A by 1.

B

is $4 + \text{the number of physical records per control interval for a write check}$; otherwise, B is 0.

C

is $4 + \text{the number of physical records per control interval}$. For an RPS device, add 1.

D

is the number of physical records per control interval for write format; otherwise, D is 0.

E

is the product of the number of physical records per control interval and 4, if physical record size is equal to or less than 2048, or 8, if physical record size is 4096, rounded up to a multiple of 8.

F

is 5 times the number of physical records per control interval, rounded up to a multiple of 8.

- CPA (Channel Program Area), used to preformat tracks. One track-preformat CPA exists for the data component and another for the index component when opened for output processing. The size of the CPA when used to preformat tracks is calculated as follows:

$$88 + 8(A + B + C) + 2D + E$$

where:

A

is 4 + 2 times the number of physical records per track. For an RPS device, add 1.

B

is 4 plus the number of physical records per track for write check; otherwise, B is 0.

C

is the number of physical records per track.

D

is the product of the number of physical records per track and 4, if physical record size is equal to or less than 2048, or 8, if physical record size is 4096.

E

is 5 times the number of physical records per track, rounded up to a multiple of 8.

The following example shows how to calculate the record-management control block requirements when opening a key-sequenced data set in non-create mode for output processing. Recall that a key-sequenced data set involves both a data component and an index component. Additional assumptions about the data set and processing are:

1. Key length is 8.
2. Number of data buffers is 2; number of index buffers is 1.
3. Number of places VSAM is to keep track of in the data set is 1.
4. Number of data extents is 1; the number of index extents is 1.
5. Data is not divided into key ranges.
6. Sequence set is not with data.
7. Number of physical records per control interval is 1.
8. Number of physical records per track in the data component is 6; number of physical records per track in the index component is 20.

9. Physical record size for the data component is 2048; physical record size for the index component is 512.
10. Processing includes update write with no write check on an RPS device.
11. Because output processing is to be performed, one preformat BUFC and CPA is required for the data and one preformat BUFC and CPA is required for the index.

Figure 6 shows each control block, the summary formula by which its size is calculated, and the total space required for each control-block type.

ISAM Request Requirements

If the ISAM interface is used (that is, if programs that use ISAM macros are used to process VSAM data sets), additional storage is required in the user's address space.

Figure 7 shows the storage required for modules to process ISAM-program requests.

The SYNAD function is always required for ISAM programs. The modules required to fulfill the requests shown in Figure 7 are loaded by Open and deleted by Close.

ISAM-program storage requirements for control blocks and buffers can be estimated, as follows:

$$\text{Storage (in bytes)} = 232 + (264 + \text{record length})n$$

where n is 1 for QISAM or the number of buffers for BISAM.

Control Block	Summary Formula	Calculation	Total
AMBL	$52 + 4N$	$52 + 4 * 2$	60
DDEB	56		56
AMB	80 * number of AMBs	$80 * 2$	160
AMDSB (data)	152		152
AMDSB (index)	152		152
DIWA	48		48
ICWA	$56 + 3K$	$56 + 3 * 8$	80 ¹
IMWA	$76 + 3K$	$76 + 3 * 8$	104 ¹
BUFC (data)	$16 + 28(A + B)$	$16 + 28(2 + 1)$	104 ¹
BUFC (index)	$16 + 28(A + B)$	$16 + 28 * (1 + 1)$	72 ¹
IOB (data)	$N(120 + 8A)$	$1(120 + 8 * 2)$	136
IOB (index)	128N	$128 * 1$	128
ARDB	number of ARDBs(29 + 2K)	$2(29 + 2 * 8)$	96 ²
PLH	$4 + A * B$	$4 + 1 * (224 + 8)$	236 ³
EDB (data)	$8 + 20E$	$8 + 20 * 1$	32 ¹
EDB (index)	$8 + 20E$	$8 + 20 * 1$	32 ¹
DEB (data)	$80 + 16E$	$80 + 16 * 1$	96
DEB (index)	$80 + 16E$	$80 + 16 * 1$	96
CPA (buffers)	number($88 + 8(A + B + C + D) + 2E + F$)	$3(88 + 8(4 + 0 + 6 + 0) + 2 * 4 + 5 * 1)$	552 ⁴
CPA (track preformat, data)	$88 + 8(A + B + C) + 2 * D + E$	$88 + 8(17 + 0 + 6) + 2 * 24 + 6$	352 ⁵
CPA (track preformat, index)	$88 + 8(A + B + C) + 2 * D + E$	$88 + 8(45 + 0 + 20) + 2 * 80 + 20$	872 ⁵

¹ This value was rounded up to a multiple of 8.

² The expression $29 + 2K$ was rounded up to a multiple of 4; the total was subsequently rounded up to a multiple of 8.

³ The value of B was rounded up to a multiple of 4.

⁴ The value of F was rounded up to a multiple of 8.

⁵ The value of E was rounded up to a multiple of 8.

Figure 6. Record Management Control Blocks Requirements—Example

Function	Storage (in bytes)
QISAM LOAD	1000
QISAM SCAN	1500
BISAM	1700
FREEDBUF	350
SYNAD	1000

Figure 7. Storage Required for ISAM-Program Requests

Real Storage

In calculating real storage required for the system queue area (SQA), include the following for VSAM:

$$32 + M + W_1 \dots W_n$$

M and W represent the system queue space required for the master catalog and user catalog, respectively.

A catalog requires system queue space equal to $2974 + 1848X + 48Y + 72Z + (80 + 96X + 16Y)L$. The values used to calculate system queue space for VSAM catalogs are:

- X, which is buffer space/1024. X must be an integer value and must be equal to or greater than 3 and equal to or less than 8.
- Y, which is the number of 512-byte physical records per track.
- Z, which is the number of extents in the catalog.
- L, which is 1 if write checking is performed; otherwise, 0.

Auxiliary Storage

VSAM uses auxiliary storage on direct-access volumes for catalogs, system libraries, and data sets.

Catalog

For information on how to calculate the auxiliary storage required for a VSAM catalog, see "How to Create a Data Set" in *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3818.

System Libraries

VSAM requires space in system libraries, as follows: for SVCLIB or LPALIB, 70 tracks; for MACLIB, 50 tracks; and for LINKLIB, 60 tracks.

Data Sets

Auxiliary storage is required for VSAM data sets. Storage required for entry-sequenced data sets is equal to the length of the data records plus the length of the control information that describes the data records and the control intervals in which they reside (Record Definition Fields and Control Interval Definition Fields). Because of the number of variables involved,

3. The number of control intervals for levels of the index other than the sequence set is determined by the maximum number of control intervals on a level that can be pointed to by one index control interval on the next higher level. The maximum number of control intervals that can be pointed to depends on the number of pointers possible in a control interval. The maximum number of pointers is the smaller of X and Y, which are the largest integers that allow the index control interval size to be greater than or equal to:

$$31 + 2 * (A + 2) + (3 * X)$$

or

$$31 + (8 * Y) + (2 * Z)$$

where A is the key length, in bytes; X is the number of control intervals per control area; Y is the number of control intervals per control area; and Z is the square root of Y.

4. The number of control intervals on the second level of the index is equal to:

$$A / B$$

rounded up, where A is the number of sequence set control intervals and B is the maximum number of pointers in an index control interval.

5. The number of control intervals on the third and higher levels of the index is equal to:

$$A / B$$

rounded up, where A is the number of control intervals on the next lower level and B is the maximum number of pointers in an index control interval. Continue the process until the number of control intervals on a given level of the index is equal to one, that level is the highest level of the index.

6. The number of control intervals in the index, excluding the sequence set, is equal to:

$$A + B + C$$

where A is the number of control intervals on the second level of the index, B is the number of control intervals on the third level, and C is the number of control intervals on all higher levels of the index.

7. If the sequence set is imbedded with the data, the space required for the sequence set is accounted for in the calculation of the size of the index component.
8. If the sequence set is imbedded with the data and the higher level index is replicated, the number of tracks required for the higher level index is equal to the number of higher level index control intervals.
9. If the sequence set is imbedded with the data and the higher level index is not replicated, the number of tracks required for the higher level index is equal to:

$$A / B$$

rounded up, where **A** is the number of higher level index records and **B** is the number of index control intervals per track. The number of index control intervals per track depends on the device type used for the index. Recalling that for the index, physical block size equals control-interval size, the number of control intervals per track is equal to:

$$1 + ((C - D) / E)$$

where **C** is track capacity; **D** is the length of the last block; and **E** is the length of other blocks. See *OS/VS Data Management Services Guide*, GC26-3783, for the meaning of track capacity, etc. The expression $(C - D) / E$ is rounded up.

10. If the sequence set is not with the data and neither the sequence set nor the higher level index is replicated, the number of tracks required for the index is equal to:

$$A / B$$

rounded up, where **A** is the number of control intervals in the index and **B** is the number of index control intervals per track.

11. If the sequence set is not with the data and both the sequence set and the higher level index are replicated, the number of tracks required for the index is equal to the number of index control intervals.

SYSTEM MANAGEMENT FACILITIES INFORMATION

Records are written to the System Management Facilities (SMF) data set to collect VSAM data-set and volume information. The data-set records describe the characteristics, activity, and users of data sets. They also contain information about the deletion and renaming of data sets and about new and altered VSAM catalog records. The volume records describe the space available on direct-access volumes and describe the data spaces that are recorded in a VSAM catalog.

This chapter presents SMF information that is in addition to that presented in *OS/VS System Management Facilities (SMF)*, GC35-0004.

This chapter contains the following topics:

- Records written for VSAM to the SMF data set
- Selecting records to be written using the DSV parameter
- Space requirements for records written to the SMF data set for VSAM

Records Written for VSAM

These types of information are recorded for VSAM whenever particular events occur:

- Data-set information, which is recorded whenever a component or cluster is opened, scratched, renamed, closed, or processed by end-of-volume.
- Direct access volume information, which is recorded (1) for online, direct access devices at IPL, (2) when a volume is demounted, (3) for online, direct access devices when a HALT EOD or SWITCH command is issued, and (4) when a VSAM data space is defined or deleted.
- Catalog information, which is recorded whenever a component or cluster is cataloged in a VSAM catalog or its catalog record is altered or deleted.

Figure 8 lists the records written for VSAM, describes when each record is written, and indicates the kind of information contained in each record.

Note: Although record types 63 and 67 conform to the SMF header format and are written to the SMF data set, they are not to be treated as SMF records. Record types 63 and 67 are provided to collect VSAM recovery information and are subject to revision.

Record Type	When Written	Information Contained
62	At the successful or unsuccessful opening of a VSAM component.	The name of the catalog in which the component or cluster is defined and the volumes on which the catalog and the component or cluster are stored.
63	After a cluster or component is cataloged in a VSAM catalog and after a catalog record is altered.	Catalog record for a newly defined cluster or component and the old and new versions of an altered catalog record.
64	When a VSAM component or cluster is closed, when it becomes necessary to switch to another volume to continue to process, or when no more space is available on a volume. One record is written for each component closed; if a cluster is closed, one record is written for each component in the cluster.	Condition that caused the record to be written, identifies the volume(s) on which the component is stored, extents of the component on the volume(s), and statistics about processing events that have occurred since the component was opened.
67	When a component or cluster is deleted.	Name of VSAM catalog in which the component or cluster was defined and the catalog record for the component or cluster.
68	When a cluster or component is renamed.	Name of VSAM catalog in which the component is defined and the old and new names.
69	When a data space is defined, extended, or deleted.	Information about the catalog in which the data space is defined, the volume on which it is allocated, the number of free data space extents on that volume and the amount of available space in them.

Figure 8. VSAM Records

Record Type 62 (VSAM Cluster or Component Opened)

Record type 62 is written at the successful or unsuccessful opening of a VSAM component or cluster. The length is 138 bytes plus 10 bytes for each volume listed.

Record type 62 identifies the VSAM component or cluster and indicates whether it was successfully opened. It names the VSAM catalog in which the component or cluster is defined and gives the volume serial number of the volume on which this catalog is stored. It gives the volume serial number(s) and device type(s) of the volume(s) on which the component or cluster is stored. The job that issued the OPEN macro is identified by job log number and user identification.

The format is:

Dec. Displace- ment	Hex. Displace- ment	Field Size	Data Format	Content
0	0	1	binary	System indicator Bit Meaning When Set 6 VS2 7 VS1
1	1	1	binary	Record type 62
2	2	4	binary	Time, in hundredths of a second, record was moved to SMF buffer
6	6	4	packed	Date record was moved to SMF buffer in the form 00YYDDDF, where F is the sign
10	A	2	EBCDIC	System identification
12	C	2	EBCDIC	System model identifier
14	E	8	EBCDIC	Job name ¹
22	16	4	binary	Time, in hundredths of a second, that reader recognized JOB statement for this job ¹
26	1A	4	packed	Date reader recognized JOB statement for this job, in form 00YYDDDF, where F is the sign ¹
30	1E	8	EBCDIC	User identification field from common exit parameter area
38	26	4	binary	Open status indicator Bit Meaning When Set 0 Successful 1 Security violation, that is, invalid password
42	2A	44	EBCDIC	Name of catalog in which the component or cluster is defined
86	56	6	EBCDIC	Volume serial number of the volume containing the catalog
92	5C	44	EBCDIC	Name of the component or cluster
136	88	2	binary	Number of online volumes containing the component or cluster ²

For each volume, there is a 10-byte entry with the following format:

6	EBCDIC	Volume serial number
4	binary	Device type ³

¹ The job name and the time and date that the reader recognized the JOB statement for this job constitute the job log number. If a system task issued the OPEN macro, the job-name field may contain blanks, and the time and date fields contain zeros.

² The number of volumes is also the number of pairs of fields in the list of volumes. Each pair is 10 bytes long.

³ This is the UCBTYP field from the unit control block.

Record Type 63 (VSAM Cluster or Component Cataloged)

Record type 63 is written after a VSAM cluster (including a catalog) or component is defined and when the definition is altered. One record is written for each catalog entry (cluster or component) affected. For example, if a cluster is defined, three records are written: one for the relationship between the components of the cluster and one for each of the components (the data and index components). This record is also written after a nonVSAM data set is defined in a VSAM catalog and when a definition is altered. The length is 128 bytes plus the length of the catalog records required to describe the cluster or component. See "How to Create a Data Set" in *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3818, for information on how to calculate the length of VSAM catalog records.

Record type 63 identifies the catalog in which the cluster or component is defined, gives the new definition and, for an alteration, gives the parts of the old record that have been altered. The job is identified by job log number and user identification.

Note: Record type 63 conforms to the SMF header format and is written to the SMF data set; however, record type 63 is not to be treated as an SMF record. This record is subject to revision.

The format is:

Dec. Displace- ment	Hex. Displace- ment	Field Size	Data Format	Content
0	0	1	binary	System indicator Bit Meaning When Set 6 VS2 7 VS1
1	1	1	binary	Record type 63
2	2	4	binary	Time, in hundredths of a second, record was moved to SMF buffer
6	6	4	packed	Date record was moved to SMF buffer in the form 00YYDDDF, where F is the sign
10	A	2	EBCDIC	System identification
12	C	2	EBCDIC	System model identifier
14	E	8	EBCDIC	Job name ¹
22	16	4	binary	Time, in hundredths of a second, that reader recognized JOB card for this job ¹
26	1A	4	packed	Date reader recognized JOB card for this job, in form 00YYDDDF, where F is the sign ¹
30	1E	8	EBCDIC	User identification field from common exit parameter area
38	26	1	binary	New or alteration indicator Bit Meaning When Set 0 New definition 1 Altered definition
39	27	1	binary	Type of entry 0 Cluster 1 VSAM data component 2 Index component 3 Catalog 4 NonVSAM data set
40	28	2	binary	Size of new catalog record ²
42	2A	2	binary	Size of old catalog record (altered records only) ³
44	2C	44	EBCDIC	Name of the catalog in which the entry is defined
88	58	44	EBCDIC	Entry name
132	84		binary	New catalog record ⁴
			binary	Old catalog record (contains only those records that were altered)

¹ The job name and the time and date that the reader recognized the JOB statement for this job constitute the job log number.

² The size of the new catalog record is also the size of the first variable field.

³ The size of the old catalog record (altered records only) is also the size of the second variable field.

⁴ The format of a record in a VSAM catalog is described in OS/VS Virtual Storage Access Method (VSAM) Logic, SY26-3817.

Record Type 64 (VSAM Component Status Upon Closing or Reaching End of Space on a Volume)

Record type 64 is written when a VSAM component or cluster is closed, when it becomes necessary to switch to another volume to continue to read or write, and when there is no more space available to continue to process. If a cluster is closed, one record is written for each component in the cluster. The length is 228 bytes plus the length of the list of extents.

Record type 64 indicates whether the component was closed, another volume was switched to, or no additional space was available. It describes the device and volume(s) on which the component is stored. It gives statistics about various processing events that have occurred since the component was defined, such as the number of records in the data component, the number of records that have been inserted, and the number of control intervals that have been split. The job is identified by job log number and user identification.

The format is:

Dec. Displacement	Hex. Displacement	Field Size	Data Format	Content
0	0	1	binary	System indicator Bit Meaning When Set 6 VS2 7 VS1
1	1	1	binary	Record type 64
2	2	4	binary	Time, in hundredths of a second, record was moved to SMF buffer
6	6	4	packed	Date record was moved to SMF buffer, in the form 00YYDDDF, where F is the sign
10	A	2	EBCDIC	System identification
12	C	2	EBCDIC	System model identifier
14	E	8	EBCDIC	Job name ¹
22	16	4	binary	Time, in hundredths of a second, that reader recognized JOB card for this job ¹
26	1A	4	packed	Date that reader recognized JOB card for this job, in form 00YYDDDF, where F is the sign ¹
30	1E	8	EBCDIC	User identification field from common exit parameter area
38	26	1	binary	Situation indicator Bit Meaning When Set 0 Close 1 Volume switch 2 No space available
39	27	1	binary	Indicator of component being processed Bit Meaning When Set 0 Data component 1 Index component
40	28	44	EBCDIC	Name of the catalog in which the component is defined
84	54	44	EBCDIC	Name of the component

Dec. Displacement	Hex. Displacement	Field Size	Data Format	Content
128	80	2	binary	Number of tracks that were requested but could not be allocated
130	82	4	binary	Current high RBA ²
134	86	2	binary	Length of the extent information in the following fields

For each extent, there is a 26-byte entry with the following format:

4	packed	Beginning cylinder and track, in the form CCHH, where CC is the cylinder number and HH is the track number
4	packed	Ending cylinder and track, in the form CCHH, where CC is the cylinder number and HH is the track number
6	EBCDIC	Volume serial number
2	binary	Channel and unit
2	binary	Spindle identification
4	binary	Unit type ³
4		Reserved

Statistics Segment:⁴

4	binary	Length of statistics section, including this field
4	binary	Number of levels in the index
4	binary	Number of extents
4	binary	Number of records in the component
4	binary	Number of records that have been deleted in a component
4	binary	Number of records that have been inserted in the component
4	binary	Number of records that have been updated in the component
4	binary	Number of records that have been retrieved from the component
4	binary	Number of unused control intervals in the component
4	binary	Number of control intervals that have been split in the component
4	binary	Number of control areas that have been split in the component
4	binary	Number of EXCPs

Change from OPEN in Statistics at time of EOVS and CLOSE:

4	binary	Change in number of levels in the index
4	binary	Change in number of extents
4	binary	Change in number of records
4	binary	Change in number of records that have been deleted in the component
4	binary	Change in number of records that have been inserted in the component
4	binary	Change in number of records that have been updated in the component

Dec. Displace- ment	Hex. Displace- ment	Field Size	Data Format	Content
		4	binary	Change in number of records that have been retrieved from the component
		4	binary	Change in number of unused control intervals in the component (this value can be negative)
		4	binary	Change in number of control intervals that have been split in the component
		4	binary	Change in number of control areas that have been split in the component
		4	binary	Change in number of EXCPs

¹ The job name and the time and date that the reader recognized the JOB statement for this job constitute the job log number. If a system task caused this record to be written, the job-name field may contain blanks, and the time and date fields contain zeros.

² This field is applicable only when the record is written during loading—not for subsequent processing.

³ This is the UCBTYP field from the unit control block.

⁴ All of the fields are present. Inapplicable ones contain zeros. The numbers are cumulative, from the time the object was defined.

Record Type 67 (VSAM Entry Deleted)

Record type 67 is written when a VSAM catalog entry (a cluster, catalog, component, or nonVSAM data set) is deleted. The length is 126 bytes plus the length of the catalog records that describe the entry.

Record type 67 identifies the entry deleted and the VSAM catalog in which the object was defined. Record type 67 also gives the record that was deleted from the catalog. A record is written for each entry deleted. For example, three records are written for an indexed cluster—one for the relationship between the components of the cluster, one for the data component, and one for the index component. The job is identified by job log number and user identification.

Note: Record type 67 conforms to the SMF header format and is written to the SMF data set; however, record type 67 is not to be treated as an SMF record. This record is subject to revision.

The format is:

Dec. Displacement	Hex. Displacement	Field Size	Data Format	Content
0	0	1	binary	System indicator Bit Meaning When Set 6 VS2 7 VS1
1	1	1	binary	Record type 67
2	2	4	binary	Time, in hundredths of a second, record was moved to SMF buffer
6	6	4	packed	Date record was moved to SMF buffer, in the form 00YYDDDF, where F is the sign
10	A	2	EBCDIC	System identification
12	C	2	EBCDIC	System model identifier
14	E	8	EBCDIC	Job name ¹
22	16	4	binary	Time, in hundredths of a second, that reader recognized the JOB card for this job ¹
26	1A	4	packed	Date reader recognized the JOB card for this job, in the form 00YYDDDF, where F is the sign ¹
30	1E	8	EBCDIC	User identification field from common exit parameter area
38	26	1	binary	Type of deletion Bit Meaning When Set 0 Uncataloged ² 1 Scratched ²
39	27	11	binary	Indicator of object deleted ³ Bit Meaning When Set 0 Cluster 1 Data component 2 Index component 3 Catalog 4 NonVSAM data set
40	28	44	EBCDIC	Name of the catalog in which the entry was defined

Dec. Displace- ment	Hex. Displace- ment	Field Size	Data Format	Content
84	54	44	EBCDIC	Name of the entry that was deleted
128	80	2	binary	Size of the catalog record that defined the entry ⁴
130	82		binary	Catalog record ⁵

¹ The job name and the time and date that the reader recognized the JOB statement for this job constitute the job log number.

² Both indicators are set for a VSAM cluster or component; for other entries, only the uncataloged bit is set, except for a nonVSAM entry, in which case the uncataloged bit is always set, but the scratched bit is set only if the physical nonVSAM space was deleted.

³ An index alone cannot be deleted, but when a cluster is deleted, one of the three catalog records deleted is a record for the index if the cluster was indexed.

⁴ The size of the entry is also the size of the field containing the catalog record.

⁵ The format of a record in a VSAM catalog is described in the chapter "Data Areas" in OS/VS Virtual Storage Access Method (VSAM) Logic, SY26-3817.

Record Type 68 (VSAM Entry Renamed)

Record type 68 is written when a VSAM catalog entry (a cluster, component, nonVSAM data set, or catalog) is renamed. The length is 166 bytes.

Record type 68 identifies the entry defined and gives the old name and the new name. The job is identified by job log number and user identification.

The format is:

Dec. Displace- ment	Hex. Displace- ment	Field Size	Data Format	Content
0	0	1	binary	System indicator
				Bit Meaning When Set
				6 VS2
				7 VS1
1	1	1	binary	Record type 68
2	2	4	binary	Time, in hundredths of a second, record was moved to SMF buffer
6	6	4	packed	Date record was moved to SMF buffer in the form 00YYDDDF, where F is the sign
10	A	2	EBCDIC	System identification
12	C	2	EBCDIC	System model identifier
14	E	8	EBCDIC	Job name ¹
22	16	4	binary	Time, in hundredths of a second, that reader recognized the JOB card for this job
26	1A	4	packed	Date reader recognized the JOB card for this job, in form 00YYDDDF, where F is the sign
30	1E	8	EBCDIC	User identification field from common exit parameter area
38	26	44	EBCDIC	Name of the catalog in which the entry is defined
82	52	44	EBCDIC	Old name of the entry
126	7E	44	EBCDIC	New name of the entry

¹ The job name and the time and date that the reader recognized the JOB statement for this job constitute the job log number.

Record Type 69 (VSAM Data Space Defined or Deleted)

Record type 69 is written when a VSAM data space is defined, extended, or deleted. The length is 98 bytes.

Record type 69 gives the total number of free data space extents and the amount of unallocated space on the affected volume after the definition, extension, or deletion of the data space. The job is identified by job log number and user identification.

Record type 69 is not written for define-space activity when a catalog is defined or when a unique data set definition occurs.

The format is:

Dec. Displace- ment	Hex. Displace- ment	Field Size	Data Format	Content
0	0	1	binary	System indicator Bit Meaning When Set 6 VS2 7 VS1
1	1	1	binary	Record type 69
2	2	4	binary	Time, in hundredths of a second, record was moved to SMF buffer
6	6	4	packed	Date record was moved to SMF buffer, in the form 00YYDDDF, where F is the sign
10	A	2	EBCDIC	System identification
12	C	2	EBCDIC	System model identifier
14	E	8	EBCDIC	Job name ¹
22	16	4	binary	Time, in hundredths of a second, that reader recognized the JOB card for this job ¹
26	1A	4	packed	Date reader recognized the JOB card for this job, in the form 00YYDDDF, where F is the sign ¹
30	1E	8	EBCDIC	User identification field from common exit parameter area
38	26	2	binary	Channel and unit
		2	binary	Spindle identification
42	2A	2	binary	Number of data spaces on the affected volume after the data space is defined, extended, or deleted
44	2C	2	binary	Number of unallocated cylinders in all of the data spaces on the volume
46	2E	2	binary	Number of unallocated tracks in all of the data spaces on the volume in addition to the number of free cylinders
48	30	2	binary	Number of cylinders in the largest continuous unallocated area in any data space on the volume
50	32	2	binary	Number of tracks (in addition to the number of free cylinders) in the largest continuous unallocated area in any data space on the volume
52	34	44	EBCDIC	Name of the catalog in which the data space is (or was) defined
96	60	6	EBCDIC	Volume serial number of the volume on which the data space is (or was) allocated

¹ The job name and the time and date that the reader recognized the JOB statement for this job constitute the job log number. If this information is not available when this record is to be written, the job-name field contains blanks, and the time and date fields contain zeros.

Selecting Records to be Written to the SMF Data Set

The SMF DSV and OPT parameters are optional parameters that specify the record types to be written to the SMF data set.

DSV Parameter

The DSV parameter is an optional parameter that specifies the type of data-set information and/or direct-access volume information to be collected.

The format of the DSV parameter is:

[DSV={0 | 2 | 3}]

where:

- 0
specifies that neither data set information nor direct access volume information is to be collected by SMF (Record types 14 through 19 and 62 through 69, which contain data set information and direct access volume information, are suppressed; for VS1, record type 20 is also suppressed.) If the parameter is omitted, 0 is assumed.
- 1
specifies that direct access volume information (record types 19 and 69) is to be collected by SMF and record types 14, 15, 17, 18, 62, 63, 64, 67, and 68, which contain data set information, are suppressed. For VS1, record type 20 is also suppressed.
- 2
specifies that data set information (record types 14, 15, 17, 18, 62, 63, 64, 67, and 68, and, for VS1, record type 20) is to be collected by SMF and record types 19 and 69, which contain direct access volume information, are suppressed.
- 3
specifies that both data set information and direct access volume information (record types 14, 15, 17 through 19, and 62 through 69, and, for VS1, record type 20) is to be collected by SMF.

Note: The DSV parameter interacts with the OPT parameter. If OPT=1 is specified and DSV=2 or DSV=3 is also specified, OPT=2 is used instead of OPT=1.

OPT Parameter

- The OPT parameter is an optional parameter that specifies the type of system, job, and job step information to be collected by SMF.

The format of the OPT parameter is:

[OPT={1 | 2}]

where:

- 1
specifies that only system and job information is to be collected (that is, record type 4, which contains job step information, is suppressed) and that the step-related exit, IEFUSI is not taken.

2

specifies that system, job, and job step information is to be collected. If the OPT parameter is omitted, 2 is assumed.

Space Required for VSAM SMF Records

Space must be allocated for the SMF SYS1.MANX and SYS1.MANY data sets. The space to be allocated for these data sets depends on the size of the records they are to contain. Figure 9 shows the size of records written to the SMF data set for VSAM.

Category of Data	Event or Status	Use Factor MAN=DSV=	Record Type	Record Size (in bytes)
Auxiliary Storage Data	VSAM data space is defined, extended, or deleted	ALL 1,3	69	98
Data Set Activity Data	VSAM cluster or component opened	ALL 2,3	62	138 + 10 per volume
	VSAM cluster or component cataloged	ALL 2,3	63	128 + length of catalog records
	VSAM cluster or component closed or EOVS	ALL 2,3	64	228 + 26 per extent
	VSAM catalog entry deleted	ALL 2,3	67	126 + length of the catalog record
	VSAM catalog entry renamed	ALL 2,3	68	166
VS Data Management	Record Descriptor Word	ALL		4
	Block Descriptor Word	ALL		4

Figure 9. Size of Records Written for VSAM

Figure 10 is an example of how VSAM records written to the SMF data set influence VS1 space requirements for an entire data set, given certain assumptions.

Event or Status	Type	Assumption	Example No. of Bytes per Record	Example No. of Records	System Related Records
Scratch a VSAM Catalog Entry	67	Once per 8 hours	1,280	2	2,560
Rename a VSAM Catalog Entry	68	Once per day	170	1	170
Create a VSAM Component or Cluster	63	Once per 8 hours	1,024	2	2,048
Alter a VSAM Component or Cluster	63	Once per hour	1536	16	24,576
Step Processing	62	Open 2 components per step, 1 step per job	168	2	336
	64	1 EOVS and 1 Close per VSAM component ¹	310	6	1,860

¹ The component is assumed to reside on two volumes and to require a total of six extents.

Figure 10. Example of Data Space Required by Records Written for VSAM to the SMF Data Set



CHECKPOINT/RESTART SUPPORT

The checkpoint/restart information for VSAM presented in this chapter is in addition to checkpoint/restart information found in *OS/VS Checkpoint/Restart*, GC26-3784. The topics covered in this chapter are:

- Implicit requests for ENQ
- Repositioning a VSAM data set
- Preserving the contents of a data set
- Restrictions

Implicit Requests for ENQ

Some serially reusable resources are requested implicitly by data-management macro instructions. You must not establish checkpoints while you have control of such resources. If a VSAM cluster is specified implicitly, the restart program will obtain the names of the data set and the index from the catalog and issue an ENQ macro against each of them.

Repositioning a VSAM Data Set

The checkpoint routine records information needed to reposition VSAM data sets open at the checkpoint if restart occurs at a checkpoint.

When the checkpoint routine records positioning for a VSAM data set, all outstanding I/O requests for the data and index are completed before the contents of the user's address space are saved. If an error occurs while these I/O requests are being processed, the checkpoint procedure stops and a code of X'0C' is returned in register 15. You may handle the error condition and reissue the CHKPT macro instruction.

Preserving Data-Set Contents

After taking a checkpoint, you must ensure that the contents of your data sets are not changed in a manner that would make a successful restart impossible.

For an entry-sequenced output data set, all data added after the last checkpoint was taken is logically erased unless the AMP=CROPS={NRE | NRC} subparameter is specified in the DD statement for the data set. If data is erased, the catalog record for the data set is updated to reflect the current end of data and the data-set statistics are adjusted to reflect the new status.

For a key-sequenced data set, restart does not erase any data. It does, however, detect modification of the data set by either the checkpointed program or another program that used the data set between the checkpoint and the restart. If the data set has been modified, the restart is terminated unless the user overrides the testing of the data set by using the AMP=CROPS=NCK subparameter in the DD statement for the data set.

You must be aware that you are responsible for handling problems that arise because of changes in the data. For example, consider a program that updates records in a data set by adding a number to the value already existing in some field within the record. If the program terminates and is restarted, you must

ensure that the records processed between the checkpoint and the termination are not processed again after the restart.

To prevent data from being erased or to allow restart with modified data sets, the AMP subparameter must be coded in the DD statement for the cluster or data set. See *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3818, for a complete description of the AMP parameter.

Restrictions

- When a VSAM key-sequenced data set is opened in create mode, no checkpoints are allowed. If a checkpoint is attempted during this initial loading, a code of X'08' is returned in register 15.
- If an attempt to close a VSAM data set failed, the catalog was not updated. If the job using this data set is to be restarted, use the Access Method Services VERIFY command to update the catalog.

MESSAGES AND CODES

The routing and descriptor codes, system completion codes, and messages for VSAM and Access Method Services are presented in the topics that follow.

Routing and Descriptor Codes

Some VSAM messages are issued through the WTO/WTOR macro instruction. Routing codes, which provide the ability to route messages to selected functions or consoles, and descriptor codes, which provide the method of displaying a message on a console, are described here for those who intend to alter the IBM-supplied codes for VSAM messages.

The routing code for IEC250I, IEC251I, IEC252I, and IEC253I, is 11. This code is used for messages of interest only to the problem programmer. This routing code is used because the program issuing the message has no way of routing the message to the programmer via the system output data set facility. The messages associated with routing code 11 appear in the job's system output message class.

The descriptor code for IEC250I, IEC251I, IEC252I, and IEC253I is 6. This code is used for any message that contains status information regarding a job or job step.

For complete information on routing and descriptor codes, see *OS/VS Message Library: Routing and Descriptor Codes*, GC38-1004.

System Completion Codes

VSAM uses the following system completion code:

03B

Explanation: The error occurred during execution of an OPEN macro instruction for an indexed-sequential data set. When issued by the ISAM interface, no records could be processed because of one of the following error conditions:

- KEYLE, LRECL, or RKP, as specified in the DCB, do not correctly correspond with the attributes specified when the data set was defined using Access Method Services.
- When opening a DCB for QISAM output, DISP=OLD is valid only for the initial creation of the data set. When the data set contains records, DISP=OLD is invalid because the ISAM interface does not support the ISAM reload function.

Programmer Response: Either erase the data set and create another one with attributes that correspond with the DCB or, if reload is desired, erase the existing data set with Access Method Services and create another one. If resume load is desired, specify DISP=MOD.

Messages

The messages listed and explained here are in addition to messages in the *OS/VS Message Library: VS1 System Messages*, GC38-1001, and *OS/VS Message Library: VS2 System Messages*, GC28-1002.

The messages are listed in alphameric order. The messages are explained as fully as possible to permit you to understand a condition or to take necessary action for successful completion of your work. The information presented for each message is:

- *Explanation:* What the message means, why it appears, what caused it, what its variable entry fields are.
- *System Action:* What happens as a result of the condition that caused the message.
- *Programmer Response:* If a response is necessary, who performs it, what the pertinent responses are and their effect on the system or program.
- *Problem Determination:* If the problem recurs or is persistent to the point that system efficiency suffers, what actions can be performed to obtain adequate data for trained hardware or programming support personnel to diagnose the problem.

Problem determination refers you to a tabular listing of problem determination actions, located on a fold-out page at the back of this book. These action tables do not teach diagnostic techniques, but instruct the operator or programmer about what to do when problems recur. The problem determination actions are aids to identify the hardware or programming problems and then ensure that qualified support personnel will have the essential programming information available to diagnose and correct the difficulty.

VSAM Control Block Expansion Messages (IDA)

The VSAM control-block expansion messages are provided for the programmer in the SYSPRINT data set. These messages have the following format:

ss,***IDAnnn text

where:

ss

is a severity code that indicates the effect of the error on the execution of programs being assembled, as follows:

4

indicates that successful execution is probable in spite of the error condition.

8

indicates that execution may fail.

12

indicates that the error is serious; successful execution is improbable.

text

is the message text.

The control-block expansion messages follow.

IDA001 INVALID POSITIONAL PARAMETER, xxx - IGNORED

Explanation: A positional parameter whose name is xxx was specified. The specified parameter is not valid.

System Action: The positional parameter was ignored, and the macro instruction was expanded normally. Severity code = 4.

Programmer Response: Probable user error. Correct the invalid positional parameter and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA002 xxx KEYWORD REQUIRED - NOT SPECIFIED

Explanation: A required keyword parameter was omitted. The name of the parameter is xxx.

System Action: The macro instruction was not expanded. Severity code = 12.

Programmer Response: Probable user error. Provide the required parameter and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA003 INVALID VALUE, yyy, SPECIFIED FOR xxx KEYWORD

Explanation: The value, yyy, specified for the keyword whose name is xxx was invalid.

System Action: The macro instruction was not expanded. Severity code = 12.

Programmer Response: Probable user error. Correct the invalid value and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA004 xxx KEYWORD NOT VALID FOR EXECUTE FORM - IGNORED

Explanation: The keyword whose name is xxx was ignored and the macro instruction was expanded normally. Severity code = 4.

Programmer Response: Probable user error. Remove the keyword from the execute form of the macro. The keyword may be specified on the list form, which is referred to by the execute form.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA005 INVALID SUBLIST ITEM FOR xxx KEYWORD, yyy

Explanation: The sublist item whose name is yyy was specified, but it is not valid for the keyword whose name is xxx.

System Action: The macro instruction was not expanded. Severity code = 8.

Programmer Response: Probable user error. Remove the invalid sublist item and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA006 xxx VALUE, yyy, NOT VALID FOR LIST FORM

Explanation: The value, yyy, specified for the keyword whose name is xxx is not valid for the list form of the macro.

System Action: The macro instruction was not expanded. Severity code = 8.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA007 LOGIC ERROR IN MACRO xxx

Explanation: A logic error has occurred in the macro whose name is xxx.

System Action: The macro instruction was not expanded. Severity code = 12.

Programmer Response: Probable system error. Contact an IBM Programming Support Representative.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA008 INCOMPATIBLE SUBLIST ITEMS, yyy and zzz, for xxx KEYWORD

Explanation: The sublist items whose names are yyy and zzz, which were specified for the keyword whose name is xxx, are incompatible.

System Action: The macro instruction was not expanded. Severity code = 12.

Programmer Response: Probable user error. Remove one of the incompatible sublist items and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA009 xxx CONTROL BLOCK KEYWORDS SPECIFIED - ONLY ONE ALLOWED

Explanation: On a TESTCB macro instruction, xxx control block keywords were specified, but only one is allowed.

System Action: The macro instruction was not expanded. Severity code = 12.

Programmer Response: Probable user error. Remove all but one of the control block keywords and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA010 EXIT ADDRESS REQUIRED FOR xxx KEYWORD - NOT SPECIFIED

Explanation: An exit address, required for the keyword whose name is xxx, was not specified.

System Action: The macro instruction was not expanded. Severity code = 8.

Programmer Response: Probable user error. Supply the required exit address and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

IDA011 xxx IS NOT A VALID yyy KEYWORD - IGNORED

Explanation: The keyword xxx was specified, but it is not a valid keyword for the yyy control block.

System Action: The invalid keyword was ignored, and the macro instruction was expanded normally. Severity code = 4.

Programmer Response: Remove the invalid keyword and resubmit the job.

Problem Determination: Table I, items 15, 19, 22, 29.

Access Method Services Messages (IDC)

The Access Method Services messages have the following format:

IDCsnnnn text

where:

s

is a code that indicates the condition code returned to indicate the severity of the problem, as follows:

0

is associated with a condition code of 0, which means that the message is for information only.

1

is associated with a condition code of 4, which means that the message is a warning.

2

is associated with a condition code of 8, which indicates a possible error.

3

is associated with a condition code of 12, which indicates a definite error that did not terminate processing.

4

is associated with a condition code of 16, which indicates an error that caused processing to be terminated.

The Access Method Services messages follow.

IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 'xxx'

Explanation: This message is issued by any functional command upon its completion. If some error has occurred, the condition code is not 0. If an error has occurred, it will be indicated by error messages that precede the completion message.

System Action: **LASTCC** is set to **xxx**; **MAXCC** is also set if **xxx** is greater than the current **MAXCC** value.

Programmer Response: None.

Problem Determination: Not applicable.

IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 'xxx'

Explanation: This message is issued at the completion of the job step. The highest condition code (**MAXCC**) set during the step is printed and returned to the caller in register 15.

System Action: None.

Programmer Response: None.

Problem Determination: Not applicable.

IDC0003I FUNCTION TERMINATED. CONDITION CODE IS 'xxx'

Explanation: This message is issued when a terminating error condition has occurred while executing a functional command. Messages printed just before this message in the program listing indicate the error that occurred.

System Action: Processing continues with the next command; and **LASTCC** is set to this value; **MAXCC** is also set if this value is greater than the current **MAXCC** value.

Programmer Response: Correct the cause of the error and rerun the job.

Problem Determination: Not applicable.

IDC0005I NUMBER OF RECORDS PROCESSED WAS 'xxxxxxxxxx'

Explanation: This is an informational message indicating the number of records that were processed in the execution of the **REPRO** or **PRINT** command. If input records were selectively processed, this number will include only those actually processed. If the condition code is 0, then all records were processed. If the condition code is 4, then some of the records will not have been processed. 'Count' need *not* be specified for this situation to occur. For partial data set processing, it will be necessary that the user be familiar with the contents of the data set to tell why the condition code of 4 occurred.

System Action: None.

Programmer Response: This message might indicate that no records were processed, which could be an error.

Problem Determination: Not applicable.

IDC0204I PRECEDING COMMAND BYPASSED DUE TO CONDITION CODES

Explanation: The modal command structure specifications caused the command to be bypassed.

System Action: The command was checked for syntactic errors, but not executed.

Programmer Response: None.

Problem Determination: Table I, item 4.

IDC0206I IMPROPERLY PLACED COMMA HAS BEEN FOUND AND IGNORED

Explanation: An unneeded comma has been coded. Omitted positional parameters may not be denoted by consecutive commas.

System Action: The usage is accepted and the extraneous comma is ignored.

Programmer Response: Remove the extraneous comma.

Problem Determination: Table I, item 4.

IDC0222I WARNING:COMMAND END DELIMITER APPEARS WITHIN APOSTROPHES

Explanation: A semicolon, the optional command delimiter, has been found in an item that is enclosed within apostrophes. A closing apostrophe may have been omitted.

System Action: The usage is accepted and processing continues, treating the semicolon as a valid character.

Programmer Response: Insert the missing apostrophe, if one was omitted, and rerun.

Problem Determination: Table I, item 4.

IDC0233I TOO MANY RIGHT PARENTHESES FOUND. EXCESS IGNORED.

Explanation: Too many right parentheses have been found at the end of a subparameter list or following a first-level parameter.

System Action: The excess parentheses are ignored and scanning continues.

Programmer Response: The erroneous syntax should be corrected.

Problem Determination: Table I, item 4.

IDC0234I WARNING:TOO FEW RIGHT PARENTHESES FOUND AT END OF COMMAND

Explanation: Too few right parentheses have been found at the end of the command to properly close off the subparameter lists.

System Action: The usage is accepted and processing continues.

Programmer Response: The erroneous syntax should be corrected.

Problem Determination: Table I, item 4.

IDC0508I DATA ALLOCATION STATUS FOR VOLUME nnnnnn IS nnn

Explanation: Informational message. Allocation status for a volume containing the data object. The code indicating the status is the VSAM catalog return code; a 0 indicates success. These return codes are explained in the explanation for message IDC3007I.

Problem Determination: Not applicable.

IDC0509I INDEX ALLOCATION STATUS FOR VOLUME nnnnnn IS nnn

Explanation: Information message. Allocation status for a volume containing the index object. The code indicating the status is the VSAM catalog return code; a 0 indicates success. These return codes are explained in the explanation for message IDC3007I.

Problem Determination: Not applicable.

IDC0510I CATALOG ALLOCATION STATUS FOR VOLUME *nnnnnn* IS *nnn*

Explanation: Information message. Allocation status of volume containing the VSAM catalog. The code indicating the status is the VSAM catalog return code; a 0 indicates success. These return codes are explained in the explanation for message IDC3007I.

Problem Determination: Not applicable.

IDC0511I SPACE ALLOCATION STATUS FOR VOLUME *nnnnnn* IS *nnn*

Explanation: Informational message. Allocation status for a volume on which VSAM space is being defined. The code indicating the status is the VSAM catalog return code; a 0 indicates success. These return codes are explained in the explanation for message IDC3007I.

Problem Determination: Not applicable.

IDC0512I NAME GENERATED-*data set name*

Explanation: This is an informational message. DATA and INDEX object names are generated by VSAM catalog management, when these names have not been explicitly specified. The parenthesized character ('D' or 'I') indicates which object the name corresponds to.

Problem Determination: Not applicable.

IDC0550I ENTRY *X data set name* DELETED

Explanation: The specified entry was deleted from the VSAM catalog. *X* indicates the type of entry: C—cluster, D—data, I—index, V—volume, U—user catalog, M—master catalog, A—nonVSAM. Note that a volume entry is deleted only when the volume no longer contains any data spaces.

Problem Determination: Not applicable.

IDC0551I ** ENTRY *data set name* NOT DELETED

Explanation: An accompanying message will indicate why the entry was not deleted.

System Action: The named item is not deleted.

Programmer Response: Correct the cause of non-deletion.

Problem Determination: Table I, items 1, 3, 4.

IDC0555I DELETION OF SPACE OBJECT DID NOT CAUSE *vvvvvv* TO BE DELETED

Explanation: When a DELETE command is executed against a volume, where *vvvvvv* is its volume serial number, all empty data spaces are deleted; data spaces that still contain data set segments are not deleted. Only when all data spaces on a volume are deleted is that volume deleted from its owning catalog.

System Action: None. The volume remains owned by the catalog in which originally defined.

Programmer Response: None.

Problem Determination: Not applicable.

IDC0594I PORTABLE DATA SET CREATED SUCCESSFULLY ON *xxx* AT *xxxx*

Explanation: At this point in time the portable data set contains all information necessary to recreate the cluster being exported.

System Action: None.

Programmer Response: None.

Problem Determination: Not applicable.

IDC0603I CONNECT FOR USER CATALOG *data set name* SUCCESSFUL

Explanation: Identified the name of the catalog for which CONNECT completed successfully.

Problem Determination: Not applicable.

IDC0604I DATA SET BEING IMPORTED WAS EXPORTED ON xxxx AT xxxx

Explanation: This informational message gives the date and time that the data set was exported.

Problem Determination: Not applicable.

IDC0611I DATA SET TO BE IMPORTED ALREADY EXISTS - DELETE ATTEMPTED

Explanation: A catalog define was performed for the data set to be imported, and it failed because there was already an entry with that name in the catalog. An attempt is being made to delete this duplicate entry. The message following this message in the listing will indicate whether the delete was successful.

System Action: An attempt is made to delete the existing entry.

Programmer Response: No action. See the message following this message in the listing for an explanation of the problem.

Problem Determination: Table I, items 1, 3, 4.

IDC0922I 'xxxxxxx' DUMP ELEMENT INVALID FOR SYMBOLIC DUMP

Explanation: The specified dump element in a symbolic dump list has an invalid "type" field, or the "length" field is invalid for the specified "type". The condition code remains unchanged.

System Action: The specified dump element is ignored.

Programmer Response: Correct the length and/or type of the specified dump element.

Problem Determination: Not applicable.

IDC0923I 'xxxxxxx' ARRAY HEADER INVALID FOR SYMBOLIC DUMP

Explanation: The specified array header in a symbolic dump list has an invalid "extent" field (must be greater than 0 and less than or equal to 99), invalid "item" count field (must be greater than 0), or is an "array header" within an existing array specification ("arrays of arrays" are not allowed). The condition code remains unchanged.

System Action: The specified array header is ignored. Dump elements within the array specification are treated as single (non-arrayed) items.

Programmer Response: Correct the invalid fields of the specified array header.

Problem Determination: Not applicable.

IDC0924I DUMP ROUTINE INVOKED AT 'xxxx'

Explanation: The Access Method Services dump routine has been invoked at the specified UDUMP macro.

System Action: A dump of the IDCAMS trace tables is provided, as well as symbolic and/or full region dumps, if requested by the IDCAMS user.

Programmer Response: None.

Problem Determination: Not applicable.

IDC0925I DUMP xxx PRODUCED AT DUMP POINT xxxx

Explanation: A dump has been requested and produced at the specified 'UDUMP' macro. The dump identifier (xxx) is given.

System Action: Processing continues.

Programmer Response: None.

Problem Determination: Not applicable.

IDC1502I PASSWORD SUPPRESSION IN MODEL OBJECT

Explanation: User error. The model object was inaccessible due to insufficient password authorization.

System Action: The command is terminated.

Programmer Response: Supply the MASTERPW password of the model object.

Problem Determination: Table I, items 3, 4.

IDC1561I WKSPC LACKING FOR data set name

Explanation: A larger region size is required for this particular invocation of Access Method Services and LISTCAT.

System Action: The LISTCAT command bypasses the indicated entry, and continues processing with a condition code of 4.

Programmer Response: Rerun the job in a larger region for those entries that were bypassed.

Problem Determination: Table I, items 1, 3, 4.

IDC1564I character type IS AN UNKNOWN TYPE

Explanation: An entry returned from the catalog is a type not supported by LISTCAT.

System Action: The LISTCAT command bypasses the entry, and continues processing with a condition code of 4.

Programmer Response: None.

Problem Determination: Table I, items 3, 4.

IDC1565I entry name NOT A REQUESTED TYPE

Explanation: A desired entry was not among the types specification allowed.

System Action: The LISTCAT command bypasses the specified entry, and continues processing with a condition code of 4.

Programmer Response: Rerun the job with the correct types specification.

Problem Determination: Table I, items 3, 4.

IDC1566I entry name COULD NOT BE LISTED

Explanation: A specified entry name does not exist in the desired catalog, or may be a volume serial number to be specified with the type SPACESPACE in a separate LISTCAT command request.

System Action: The designated entry is bypassed, and processing continues with a condition code of 4.

Programmer Response: Correct the entry name and rerun the job to list this particular entry.

Problem Determination: Table I, items 1, 3, 4.

IDC1567I INVALID CONTROL INTERVAL NUMBER 'number'

Explanation: An entry identified by a control interval number in the VSAM catalog does not exist.

System Action: The designated entry is bypassed, and processing continues.

Programmer Response: None.

Problem Determination: Table I, items 1, 3, 4, 29.

IDC1595I PASSWORDS SUPPRESSED FOR EXPORTED DATA SET

Explanation: The password and other protection information was inaccessible due to insufficient password authorization. (The portable version of the data set has been created, but without the protection attributes.)

System Action: Processing of the command continues.

Programmer Response: If the protection attributes are desired, specify the master level password.

Problem Determination: Not applicable.

IDC1562I volume serial number VOLUME SERIAL NUMBER TOO LONG

Explanation: A volume serial number exceeds six characters for the types=SPACE LISTCAT request.

System Action: The LISTCAT command bypasses the indicated entry, and continues processing with a condition code of 4.

Programmer Response: Rerun the job with the corrected volume serial numbers.

Problem Determination: Table I, items 3, 4.

IDC1927I INVALID MARGINS VALUES SPECIFIED. DEFAULT MARGINS ASSUMED.

Explanation: The "leftmargin" value specified in a "margins" parameter is not strictly less than the "rightmargin" value; at least two character positions must be provided. The condition code is set to 4.

System Action: The default margin values (2,72) are assumed.

Programmer Response: Correct the invalid **MARGINS** specifications.

Problem Determination: Table I, items 1, 3, 4.

IDC2552I ENTRY TYPE IS INVALID FOR DELETE

Explanation: The types of entries that can be deleted are cluster, user catalog, master catalog, nonVSAM, space.

System Action: The entry is not deleted. The rest of the entries are deleted if possible.

Programmer Response: If the user thinks the entry is one of these types, he should list that entry with LISTCAT to check the type field.

Problem Determination: Table I, items 3, 4.

IDC2553I ERASE OPTION IS NOT ALLOWED FOR NON-VSAM OBJECT

Explanation: A nonVSAM object cannot be erased.

System Action: The entry is not deleted. The rest of the entries are deleted if possible.

Programmer Response: Resubmit the request without the **ERASE** parameter.

Problem Determination: Table I, items 1, 3, 4.

IDC2554I FILE PARAMETER IS REQUIRED FOR SCRATCH OPTION

Explanation: The file parameter is required, because the data set must be mounted to be scratched.

System Action: The entry is not deleted. The rest of the entries are deleted if possible.

Programmer Response: If you don't want the data set scratched, specify "NOSCRATCH" or else supply the **FILE** parameter.

Problem Determination: Table I, items 3, 4.

IDC2563I ALLOCATION/VOLUME PARAMETER IS INVALID FOR ENTRY TYPE(S)

Explanation: A LISTCAT command request for allocation or volume information conflicts with the desired entries or types of entries.

System Action: The LISTCAT command attempts recovery to list that part of the request that does not conflict.

Programmer Response: Rerun the job with LISTCAT parameters that are compatible with the fields specification.

Problem Determination: Table I, items 3, 4.

IDC2950I INVALID FORMAT STRUCTURE

Explanation: An element of one of the text format structures is invalid. This message should never appear in a valid program. If it does, it is a system error.

System Action: The request to print a line is ignored.

Programmer Response: Correct the format structure.

Problem Determination: Table I, items 3, 4, 29.

IDC2951I OUTPUT COLUMN SPECIFIED OUT OF RANGE

Explanation: An output column specified is outside the print line width, for example, not between columns 1 and 121. This should not occur on a checked-out Access Method Services command.

System Action: This field and subsequent fields are ignored.

Programmer Response: Correct the print column and/or the identification field in the argument.

Problem Determination: Table I, items 3, 4, 29.

IDC2952I EXCESSIVE FIELD LENGTH FOR BD OR PU CONV

Explanation: A binary to decimal or packed to unpacked conversion length was specified as greater than 15 characters. This should not occur in a valid program.

System Action: The default (15) is used.

Programmer Response: Correct the print control substructures.

Problem Determination: Table I, items 3, 4, 29.

IDC2953I A REDO SUB-STRUCTURE IS NESTED

Explanation: A redo structure cannot be defined within the set of structures to be redone. This should not occur in a valid program.

System Action: The current redo operation is terminated. All structures will be treated only once.

Programmer Response: Correct the print control substructures.

Problem Determination: Table I, items 3, 4, 29.

IDC2954I STATIC TEXT ENTRY REQUESTED NOT IN MODULE

Explanation: A static text request indicated an entry that was not in the module specified. This should not occur in a valid program.

System Action: The request is not honored.

Programmer Response: Check the static text identification furnished.

Problem Determination: Table I, items 3, 4, 26c, 29.

IDC2955I INVALID PACKED DECIMAL FIELD

Explanation: A conversion request for packed to unpacked found a digit that was not in the range 0 to 9. The input data may be wrong. This should not occur unless an incorrect field is being printed.

System Action: Conversion stops. Previously converted data will be printed.

Programmer Response: Correct the input data.

Problem Determination: Table I, items 1, 3, 4, 29.

IDC2956I REQUESTED INSUFFICIENT MAIN STORAGE.

Not large enough to execute a functional command.

IDC3006I FUNCTION TERMINATED DUE TO BEGINNING POSITION ERROR

Explanation: An error occurred when positioning to a record in a data set (such as occurs via the **FROMKEY** facility of the **PRINT** command) was attempted. The position indicator may be beyond the limits of the data set or an I/O error may have occurred in positioning. An I/O error message may have been printed.

System Action: The operation is terminated.

Programmer Response: Correct the positioning parameter value. See the I/O error message description for the I/O error indicated ahead of this message.

Problem Determination: Table I, items 1, 3, 4, 13.

IDC3007I VSAM CATALOG RETURN-CODE IS *ccc*

Explanation: This condition code was returned as the result of a catalog error or exceptional condition. This message is used only when a more specifically worded message does not exist; in most instances, a subsequent message will indicate the action taken for the command that encountered the condition. Some of the following messages are also covered by messages specific to various commands; the full list of VSAM catalog-management return codes is provided, however, for the sake of completeness. The possible return code values, their meanings and explanation, as well as the system actions and possible user responses, are listed below:

- 4 VSAM catalog does not exist or is not open. Either the VSAM master catalog is not defined on the system in which a command is being executed, or the catalog named in a **CATALOG** parameter (for example, **DEFINE** or **ALTER** commands) is not identified in a **JOBCAT** or **STEPCAT** JCL statement, or a catalog that is identified by the *dname* subparameter of the **CATALOG** parameter cannot be opened.

System Action: The command is terminated.

Programmer Response: Ensure that a VSAM master catalog exists; verify the usage of the **STEPCAT** and **JOBCAT** JCL or of the *dname* JCL statement.

Problem Determination: Table I, items 1, 3, 4.

- 8 Entry does not exist, if action is one that locates the entry; or entry already exists, if action is one that adds an entry to a catalog (for example, **DEFINE** or **IMPORT**). The first use of this return code occurs when an entry is being searched, as in **ALTER** or **DELETE** commands. The second occurs when an entry is being added to a catalog, as in **DEFINE** or **IMPORT** (where either the name of the cluster, data, or index might be duplicates). The second use also occurs when a volume being removed by an **ALTER** command is not a candidate volume; that is, it either contains part of the data set or is not in the data set's catalog entry at all. Additionally, this return code also results when a **DELETE** command specifies an incorrect entry type for the entry or entries being deleted. (Note that deletion of catalogs and data spaces requires explicit specification of the entry type.)

System Action: The command is terminated.

Programmer Response: Check that the entry name is spelled correctly; verify the use of **JOBCAT** and **STEPCAT** catalogs, if employed. In the instance of an improper **DELETE** command entry type, either remove the type specification or correct it.

Problem Determination: Table I, items 1, 3, 4.

- 12 (Reserved)

- 16 (Reserved)

- 20 Insufficient space in VSAM catalog. The catalog is full. It is impossible to obtain another extent, because there is no more space on the volume in which the catalog resides, or the maximum number of extents has been reached.

System Action: The command is terminated.

Programmer Response: Scratch unneeded data sets from the volume; delete unneeded VSAM data sets.

Problem Determination: Table I, items 1, 3, 4, 25a.

- 24 Permanent read error in VSAM catalog. The catalog cannot be read because of a permanent I/O error.

System Action: The command is terminated.

Programmer Response: Have the catalog restored.

Problem Determination: Table I, items 1, 3, 4.

- 28 Permanent I/O error in VSAM catalog. An attempted read or write operation to the catalog failed because of a permanent I/O error; (write operations occur for the DEFINE, ALTER, DELETE, and IMPORT commands).

System Action: The command is terminated.

Programmer Response: Have the catalog restored.

Problem Determination: Table I, items 1, 3, 4.

- 32 Error in VSAM catalog parameter list. This condition should not occur; if encountered, notify an IBM Programming Support Representative. Such a condition indicates an error in the IDCAMS processor.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump. (The dump identification ZZCA may be used to obtain a dump just before the CATLG macro is executed.)

Problem Determination: Table I, items 1, 3, 4, 16, 29.

- 36 Data set directory occurrence not found. This condition arises when a volume record in the catalog is invalid.

System Action: The command is terminated.

Programmer Response: Have the catalog restored.

Problem Determination: Table I, items 1, 3, 4.

- 40 Volume list or workarea too small. An attempt to provide VSAM catalog management with sufficient virtual storage in which to return cataloged information failed, because the indicated storage requirement proved to be insufficient upon reinvocation of catalog management.

System Action: The command is terminated.

Programmer Response: This condition should not occur; it happens when two or more tasks are modifying a catalog entry, causing it to be extended in size, and one task finds that it was unable to specify sufficient virtual storage for catalog management's new requirements.

Problem Determination: Table I, items 1, 3, 4, 29.

- 44 Work area too small. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 29.

- 48 Invalid VSAM catalog function. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 29.

- 52 Permanent I/O error on the volume. An attempt to modify the VTOC of the volume or to create or delete a specified data set is being defined or modified failed because of a permanent I/O error.

the operator, or the user-specified verification routine (see **AUTHORIZATION** parameter of the **DEFINE** command) fail to authorize use of the data set.

System Action: The command is terminated.

Programmer Response: Determine why the password was not accepted or why the verification routine did not permit usage of the data set.

Problem Determination: Not applicable.

- 60 Invalid entry type for requested action. This condition arises should, for example, an attempt be made to use the **DELETE** command to delete an index component of a VSAM data set; again, an attempt to use the **ALTER** command to modify an entry type with a non-supported field for that type may raise this condition.

System Action: The command is terminated.

Programmer Response: Ensure that the name of the entry specified in the command is correct; ensure that the catalog entry is still valid by performing a **LISTCAT** run.

Problem Determination: Table I, items 1, 3, 4.

- 64 Associated entry does not exist. This condition indicates that the VSAM catalog cannot find either a data or an index entry which is associated with a cluster entry, or vice versa.

System Action: The command is terminated.

Programmer Response: Restore the catalog.

Problem Determination: Table I, items 1, 3, 4, 29.

- 68 No space available on user volume. The user-specified volume cannot accommodate either the initial allocation of space for a data set or a subsequent extension.

System Action: The command is terminated.

Programmer Response: Scratch unneeded data sets from the volume, or execute an **ALTER** command to add more candidate volumes to the catalog entry for the data set.

Problem Determination: Table I, items 1, 3, 4, 25a.

- 72 User volume not mounted. An attempt to update the VTOC on the volume failed because the volume was not mounted.

System Action: The command is terminated.

Programmer Response: Ensure that the volume is mounted.

Problem Determination: Table I, items 1, 3, 4.

- 76 Appropriate unit not available for mounting. This condition arises when the **DEFER** option was specified in the JCL and it is not currently possible to allocate a unit to mount the volume; a VTOC operation was to have been performed.

System Action: The command is terminated.

Programmer Response: Ensure that a unit is available for mounting.

Problem Determination: Table I, items 1, 3, 4.

- 80 (Reserved.)

- 84 Unexpired purge date. An attempt to delete an entry failed because its expiration date has not been reached, and the **DELETE** command did not specify the **PURGE** option.

System Action: The command is terminated.

Programmer Response: Specify the **PURGE** option, if desired, and rerun the DELETE command.

Problem Determination: Not applicable.

88 (Reserved.)

92 Data set has maximum number of data space extents. The VSAM data set, or catalog, cannot be extended beyond its current space allocation because it has already reached the maximum number of extents permitted within its data spaces, namely 255 for a noncatalog VSAM data set, or 16 for a VSAM catalog.

System Action: The command is terminated.

Programmer Response: List the catalog in order to determine space fragmentation. Delete and redefine data spaces in order to reduce fragmentation. Use the REPRO command to reorganize the data set to reduce fragmentation.

Problem Determination: Table I, items 1, 3, 4, 25a.

96 (Reserved.)

100 (Reserved.)

104 VSAM catalog already exists. A DEFINE command is attempting to define a second VSAM master catalog or a user catalog that is already defined.

System Action: The command is terminated.

Programmer Response: Change the name of the user catalog being defined, or change the type of catalog being defined from master to user. Alternatively, delete the offending original catalog.

Problem Determination: Table I, items 1, 3, 4.

108 Invalid field name in field parameter list. This condition should not occur; if it does, notify an IBM Programming Support Representative. (The field name does not exist in the VSAM catalog-management dictionary.)

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 29.

112 Invalid field parameter list. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 29.

116 VSAM catalog records are invalid. VSAM catalog records (with the exception of volume records) connected with the current operation cannot be properly interpreted.

System Action: The command is terminated.

Programmer Response: Ensure that the data set specified in the JOBCAT or STEPCAT JCL is indeed a VSAM catalog. The VSAM catalog should be restored.

Problem Determination: Table I, items 1, 3, 4.

120 Attempt to modify non-existent or system field. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 29.

124 Invalid control-interval number. VSAM catalog management attempted to access a catalog record by its control-interval number, but the number is invalid.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

- 128 User-provided block outside user region. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

- 132 Invalid pointer value in argument lists. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

- 136 Required parameters not supplied. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

- 140 Inconsistent or conflicting arguments supplied. This condition occurs when inconsistent parameters are specified via a functional command to VSAM catalog management. For example, (1) when defining a VSAM catalog, the space allocation quantity specified in the cluster parameter list is less than the sum of the quantity specified in the data and index parameter list, or (2) a whole number of control intervals won't fit within the number of physical blocks times physical block size, which defines a track.

System Action: The command is terminated.

Programmer Response: To correct the conflicting catalog parameters, specify one of the following:

- a larger value for the BUFFERSPACE parameter (in increments of 512 bytes)
- a larger value for the CONTROLINTERVALSIZE parameter (in increments of 512 bytes)
- a larger value for the space allocation parameter (CYLINDERS, TRACKS, or RECORDS) or specify the allocation in terms of CYLINDERS rather than TRACKS or RECORDS

If one or more of the preceding parameters were not specified (so that VSAM supplied a default value), you can specify a value and ensure that it is larger than the default value.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

- 144 Invalid entry name; for example, initial character is numeric or name is longer than eight characters (unqualified) or forty-four characters (qualified). Also, the name of the data or index of a unique data set starts with Z999999.

System Action: The command is terminated.

Programmer Response: Supply a valid name. See *OS/VS JCL Reference*, GC28-0618, and *OS/VS VSAM Access Method Services*, GC35-0009, for naming rules.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

- 148 Volume already owned by another catalog. Only one catalog may *own* (that is, allocate space upon) a given volume.
- System Action:* The command is terminated.
- Programmer Response:* Specify a different volume, and rerun the command.
- Problem Determination:* Table I, items 1, 3, 4.
- 152 Non-empty catalog delete attempted. VSAM catalogs may only be deleted when they are completely empty, that is, have no entries that define other VSAM or nonVSAM objects.
- System Action:* The entry is not deleted.
- Programmer Response:* Delete each of the remaining entries; a LISTCAT command may be employed to determine the names of all entries.
- Problem Determination:* Table I, items 1, 3, 4.
- 156 Volume does not contain a data space with sufficient room for another VSAM data set to be allocated therein. There is insufficient space in the data spaces allocated on the volume to satisfy a request for suballocation.
- System Action:* The command is terminated.
- Programmer Response:* Use the DEFINE command to create more data spaces; delete unneeded VSAM data sets; or decrease the amount of storage required by the object being defined.
- Problem Determination:* Table I, items 1, 3, 4, 25a.
- 160 Deletion of space object did not cause volume to be deleted. A DELETE command that deletes a space object will cause all data spaces found on the volume to be deleted, except for those that still contain data belonging to non-deleted VSAM data sets. This is merely an informational message.
- System Action:* None.
- Programmer Response:* None.
- Problem Determination:* Not applicable.
- 164 Insufficient storage available for workarea. This condition arises when there is insufficient dynamic storage available to the VSAM catalog-management program.
- System Action:* The command is terminated.
- Programmer Response:* Increase the region size available to the step.
- Problem Determination:* Table I, items 1, 3, 4.
- 168 Unsupported device type. A DEFINE or IMPORT command specifies a device type that was not sysgened into the system, or is not acceptable for a VSAM catalog or data set.
- System Action:* The command is terminated.
- Programmer Response:* Specify a proper device type.
- Problem Determination:* Table I, items 1, 3, 4.
- 172 Duplicate data space name on volume. A DEFINE command specifies the name of a data set, with the UNIQUE attribute, but there is already a data set on the specified volume with that name; such a data set might be a nonVSAM data set. This will also occur when a DEFINE command for a KSDS with the UNIQUE attribute specifies more than one key range on the same volume.
- System Action:* The command is terminated.
- Programmer Response:* Choose another data set name, or scratch the original data set from the volume.
- Problem Determination:* Table I, items 1, 3, 4, 25a.
- 176 No space in VTOC for DSCB. During the definition or extension of a data space, an attempt was made to perform a DADSM allocate or extend function on a volume in which a new DSCB was to have been written, but there is no space in the VTOC for an additional DSCB.

System Action: The command is terminated.

Programmer Response: Delete any unneeded data sets or data spaces from the volume, in order to make additional DSCBs available, or recreate the volume with a larger VTOC.

Problem Determination: Table I, items 1, 3, 4, 25a.

180 Data space name not found. This condition should not occur; if encountered, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative; obtain a dump.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

184 Data set currently open cannot modify catalog entry. This condition arises when two different jobs are referencing the same VSAM data set simultaneously.

System Action: The command is terminated.

Programmer Response: Rerun the command, and to ensure proper completion, specify a disposition parameter of **OLD**, not **SHR**.

Problem Determination: Table I, items 1, 3, 4.

188 Catalog unavailable. This is a disaster situation: the VSAM catalog cannot be accessed; similar to the condition indicated by return code value 116, above.

System Action: The command is terminated.

Programmer Response: Restore the VSAM catalog.

Problem Determination: Table I, items 1, 3, 4, 29.

192 Maximum logical record length specified is greater than 32760.

System Action: The command is terminated.

Programmer Response: Specify a smaller logical record size.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

196 Data component control interval size specified greater than 32767.

System Action: The command is terminated.

Programmer Response: Specify a smaller data control interval size.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

200 Index component control interval size specified greater than maximum block size of index device.

System Action: The command is terminated.

Programmer Response: Specify a smaller index control interval size.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

204 Key specification extends beyond end of logical record.

System Action: The command is terminated.

Programmer Response: Specify the correct key length and relative key position.

Problem Determination: Table I, items 1, 3, 4, 16, 29.

208 Buffer space specified is too small. The buffer size specified during a define action is too small to contain the minimum number of control intervals for the type of VSAM data set being defined: an indexed data set requires enough virtual storage for two data component control intervals, plus one for an index component control interval; a non-indexed data set requires two for the data component.

System Action: The command is terminated.

Programmer Response: Increase the buffer size specified (via the **BUFFERSPACE** parameter of the **DEFINE** command).

Problem Determination: Table I, items 1, 3, 4.

- 212 Control interval size calculations unsolvable. This condition arises should VSAM catalog management be unable to compute an acceptable control interval size value. This condition only occurs in the **DEFINE** command.

System Action: The command is terminated.

Programmer Response: Refer to *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide* to determine which of the specifications (buffer size, control interval size, device type, and the **UNIQUE** attribute) may have caused the problem.

Problem Determination: Table I, items 1, 3, 4.

- 216 VTOC of volume invalid. The volume's VTOC is not interpretable.

System Action: The command is terminated.

Programmer Response: Have the volume restored in order to correct the VTOC.

Problem Determination: Table I, items 1, 3, 4, 25a.

- 220 DOS VTOC cannot be converted to OS VTOC. During the initial allocation or extension of a data space on a DOS formatted volume, an error occurred in DADSM when it attempted to convert the DOS VTOC to an OS VTOC.

System Action: The command is terminated.

Programmer Response: Restore the volume in order to correct the VTOC.

Problem Determination: Table I, items 1, 3, 4, 25a.

- 224 Catalog entry has exceeded maximum number of occurrences. This condition arises should one of the repeating fields within the catalog entry be requested to be extended, and the extension is not possible; for example, should more than 255 volume serials be attempted to be placed in the entry, as might happen when an **ALTER** command attempts, through the **ADDVOLUMES** parameter, to add more candidate volumes to the entry.

System Action: The command is terminated; the additional values are not added to the entry.

Programmer Response: Determine why the excessive values are being supplied.

Problem Determination: Table I, items 1, 3, 4.

- 228 Time-of-day clock read encountered error. This condition should not occur; if it does, notify an IBM Programming Support Representative.

System Action: The command is terminated.

Programmer Response: Notify an IBM Programming Support Representative.

Problem Determination: Table I, items 1, 3, 4, 30.

- 232 SMF processing error. This condition arises should an I/O error occur when writing entries to the SMF data set. This condition only arises *after* the desired actions against the catalog have been effected, and thus there is no failure in the command's execution.

System Action: The command is processed, ignoring the condition.

Programmer Response: None.

Problem Determination: Not applicable.

- 236 Error encountered in space-map. This condition arises when the catalog's volume entry is invalid.

System Action: The command is terminated.

Programmer Response: Have the catalog restored.

Problem Determination: Table I, items 1, 3, 4.

- 240 DD statement required, but not supplied. This condition occurs when a **DEFINE**, **ALTER**, or **DELETE** command requires a **FILE** parameter, but is

not given one, or the DD statement referenced by the **FILE** parameter cannot be found.

System Action: The command is terminated.

Programmer Response: Supply the required parameter, or ensure that the DD statement name is correctly spelled, or that the DD statement is present for the step.

Problem Determination: Table I, items 1, 3, 4.

- 244 Erase action failed. This condition arises should VSAM catalog management be unable to effect the complete erasure of the VSAM data set being deleted. The data set is *not* deleted from the catalog.

System Action: The delete action on that data set is voided.

Programmer Response: Determine why the erasure was impossible. Alternatively, rerun the DELETE command with the **NOERASE** option.

Problem Determination: Table I, items 1, 3, 4.

- 248 Volume record not found. This condition arises when a function requires a volume that is not owned by the VSAM catalog being used.

System Action: The command is terminated.

Programmer Response: If this occurs during a define action, check whether the volumes specified in the **VOLUMES** parameter have been defined in the catalog in which the present DEFINE command is cataloging a new VSAM object; if not, execute a define of a space object against the volumes. Further, the volumes might already be owned by a catalog other than the one in which the current object is being defined: in this case, choose other volumes or cause the volume to be owned by the current catalog. Similarly, this condition may arise during an import or alter operation.

Problem Determination: Not applicable.

IDC3200I TOO MANY POSITIONAL PARAMETERS AFTER 'xxxxxxxxxxxxxxxxxxxx'

Explanation: A parameter list has too many positional parameters specified.

System Action: Processing skips to the end of the command; interpretation of commands resumes with the next command.

Programmer Response: Remove the excess parameters and rerun the command.

Problem Determination: Table I, item 4.

IDC3201I CONSTANT 'xxxxxxxxxxxxxxxxxxxx' EXCEEDS LENGTH LIMIT

Explanation: A constant is longer than the maximum allowed by the parameter definition or by the implementation. An allowable value must be specified.

System Action: Processing skips to the end of the command; interpretation resumes with the next command.

Programmer Response: See the definition of the parameter value in question, specify an allowable value, and rerun the command.

Problem Determination: Table I, item 4.

IDC3202I ABOVE TEXT BYPASSED UNTIL NEXT COMMAND. CONDITION CODE IS 12.

Explanation: Following the occurrence of an error in the current command, the remainder of the command is bypassed. An error message preceding this message in the program listing will pinpoint the error.

System Action: No further syntax or semantic checking is done on the command in question.

Programmer Response: Correct the related error and rerun.

Problem Determination: Table I, item 4.

IDC3203I ITEM 'xxxxxxxxxxxxxxxxxxxx' DOES NOT ADHERE TO RESTRICTIONS

Explanation: A constant does not meet the naming restrictions on its format. This is usually a problem in specifying a data set name: see *OS/VS Access Method Services* for data naming conventions.

System Action: Processing skips to the end of the command; interpretation resumes with the next command.

Programmer Response: Check the data restrictions for the parameter, correct the item, and rerun the command.

Problem Determination: Table I, item 4.

IDC3205I DELIMITER 'x' IS NOT PROPERLY PRECEDED BY A CONSTANT OR KEYWORD

Explanation: A delimiter has been specified where a subparameter list or data should have appeared. The delimiter is being used improperly. Parentheses are likely to be improper or a positional parameter may be missing.

System Action: Processing skips to the end of the command; interpretation resumes with the next command.

Programmer Response: Correct the usage and rerun the command.

Problem Determination: Table I, item 4.

IDC3207I REMAINDER OF COMMAND INPUT STREAM IGNORED

Explanation: An error has occurred that prohibits further scanning of the input stream. There are preceding error messages to explain the error. The condition code (MAXCC) is always set to 16 when the remainder of the input stream is ignored.

System Action: The remainder of the command input stream has been ignored.

Programmer Response: Correct the related error and rerun the job.

Problem Determination: Table I, item 4.

**IDC3208I LEFT PARENTHESIS MISSING FOLLOWING KEYWORD
'xxxxxxxxxxxxxxxxxxxx'**

Explanation: A keyword is not properly followed by an opening parenthesis delimiting the subparameter list or constants associated with the keyword.

System Action: Processing skips to the end of the command; interpretation resumes with the next command.

Programmer Response: Check the requirements of the parameter, correct the usage, and rerun the command.

Problem Determination: Table I, item 4.

IDC3209I RIGHT PARENTHESIS MISSING AFTER 'xxxxxxxxxxxxxxxxxxxx'

Explanation: A right parenthesis is missing which should delimit the end of one or more constants. Too many items might be specified.

System Action: Processing skips to the end of the command; interpretation resumes with the next command.

Programmer Response: Correct the usage and rerun the command.

Problem Determination: Table I, item 4.

IDC3210I INVALID PARENTHESES FOR SPECIFYING REPEATED SUBPARAMETER LIST

Explanation: Parentheses for delimiting repetitions of a repeated subparameter list are missing or unmatched.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Correct the usage and rerun the command.

Problem Determination: Table I, item 4.

IDC3211I KEYWORD 'XXXXXXXXXXXXXXXXXXXX' IS IMPROPER

Explanation: A keyword has been found which is not recognized in its specified usage. It may be not applicable, misspelled, or specified as a subparameter in the wrong subparameter list.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Check the usage of the keyword and check parentheses.

Problem Determination: Table I, item 4.

IDC3212I INVALID LEFT PARENTHESIS AFTER 'XXXXXXXXXXXXXXXXXXXX'

Explanation: A left parenthesis appears to delimit a positional parameter. However, the positional parameter is not a constant or list of constants, so no parentheses are allowed.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC3213I KEYWORD 'XXXXXXXXXXXXXXXXXXXX' APPEARS TOO OFTEN

Explanation: A keyword has been coded more than once in the same parameter list or subparameter list.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Remove the redundant keyword and rerun the command.

Problem Determination: Table I, item 4.

IDC3214I HEX OR BINARY CONSTANT SPECIFIED IMPROPERLY

Explanation: A hexadecimal or binary constant is not of the form X'-----' or B'-----'.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC3215I PASSWORD MISSING AFTER 'XXXXXXXXXXXXXXXXXXXX'

Explanation: A password is missing or specified incorrectly where a password is required.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Add or correct the password and rerun.

Problem Determination: Table I, item 4.

IDC3216I ABOVE TEXT BYPASSED UNTIL NEXT COMMAND

Explanation: Following the occurrence of an error in the current command, the remainder of the command is bypassed. An error message preceding this message will pinpoint the error. The command was being scanned for syntax checking purposes only when the error was found.

System Action: No further syntax or semantic checking is done on the command in question. The system condition code is not affected.

Programmer Response: Correct the related error before rerunning.

Problem Determination: Table I, item 4.

IDC3217I PASSWORD IMPROPER AFTER 'XXXXXXXXXXXXXXXXXXXX'

Explanation: A password is found following a data item that does not allow a password.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Remove the improper password and rerun the command.

Problem Determination: Table I, item 4.

IDC3218I TOO MANY REPEATED SUBPARAMETER LISTS APPEAR

Explanation: More repeated subparameter lists are coded than are allowed.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Check the parameter description to see how many repetitions are allowed. Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC3219I VERB NAME 'XXXXXXXXXXXXXXXXXXXX' UNKNOWN

Explanation: The specified verb name is not known to the system.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Correct the improper verb name and rerun.

Problem Determination: Table I, item 4.

IDC3220I IMPROPER NUMERIC DIGIT FOUND IN 'XXXXXXXXXXXXXXXXXXXX'

Explanation: An invalid numeric digit has been found. A decimal number may use only 0-9, a hexadecimal number specified as X'——' may use only 0-9 and A-F, and a binary number specified as B'——' may use only digits 0 and 1.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC3221I CONSTANT 'XXXXXXXXXXXXXXXXXXXX' NOT WITHIN VALUE RANGE

Explanation: A constant is of a value not within the range of values allowed for this parameter.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Correct the usage and rerun. Otherwise, take no action.

Problem Determination: Table I, item 4.

IDC3223I TOO MANY CONSTANTS IN LIST BEGINNING AT 'xxxxxxxxxxxxxxxxxxxx'

Explanation: Too many constants have been coded in a list.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Check the parameter definition to see how many constants appear in the list. Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC3224I DATA ITEM 'xxxxxxxxxxxxxxxxxxxx' NOT AMONG VALID CHOICES

Explanation: The related parameter requires that its value be chosen from a predefined set of symbols. The specified item is not one of the valid choices.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC3225I REQUIRED (SUB)PARAMETER OF 'xxxxxxxxxxxxxxxxxxxx' IS MISSING

Explanation: A parameter always required by the command may be missing, or a parameter may be coded which requires this specified parameter. The missing parameter may be the keyword parameter indicated or a positional subparameter of that parameter.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Add the missing parameter and rerun.

Problem Determination: Table I, item 4.

IDC3226I INCONSISTENT PARAMETERS INVOLVING 'xxxxxxxxxxxxxxxxxxxx'

Explanation: The specified keyword indicates a parameter that may not be coded in conjunction with some other parameter that is coded.

System Action: Processing skips to the end of the command; interpretation begins with the next command.

Programmer Response: Remove one of the parameters and rerun.

Problem Determination: Table I, item 4.

IDC3231I COMMAND END OCCURS IMPROPERLY

Explanation: The syntactic end of the command has been encountered before it is expected to occur. Command continuation may be incorrect.

System Action: The command is not executed.

Programmer Response: Correct the error and rerun.

Problem Determination: Table I, item 4.

IDC3300I ERROR OPENING data set name or DDNAME

Explanation: An error was detected attempting to open *data set name* (text is DD name if DSN not available). See associated message for explanation.

System Action: See associated message for explanation.

Programmer Response: See the associated message.

Problem Determination: Table I, items 1, 3, 4.

IDC3301I ERROR CLOSING *data set name*

Explanation: Error detected attempting to close *data set name*. See the associated message in the program listing for explanation.

System Action: See associated message for explanation.

Programmer Response: Check the associated message.

Problem Determination: Table I, items 1, 3, 4.

IDC3302I ACTION ERROR ON *data set name*

Explanation: Error detected attempting to access *data set name*. See associated message for explanation.

System Action: See associated message for explanation.

Programmer Response: Check the associated message.

Problem Determination: Table I, items 1, 3, 4.

IDC3303I ** CANNOT OPEN FOR UPDATE

Explanation: Only VSAM data sets may be opened for *update* mode.

System Action: The data set is not opened, and the command is terminated.

Programmer Response: Change the DD card to specify a VSAM data set.

Problem Determination: Table I, items 1, 3, 4.

IDC3304I ** JCL STATEMENT MISSING

Explanation: The DD statement named in a **FILE**, **INFILE**, or **OUTFILE** parameter cannot be found.

System Action: Processing of the command is terminated.

Programmer Response: Check *dnames* for incorrect spelling or missing DD cards, correct the error, and rerun the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3305I ** CANNOT BE OPENED FOR OUTPUT

Explanation: The processor cannot open a data set that is not VSAM or nonVSAM physical sequential organization for output. Specifically, ISAM data sets may not be an output data set.

System Action: Processing of the command is terminated.

Programmer Response: Change the keyword value to specify either a VSAM or nonVSAM physical sequential data set.

Problem Determination: Table I, items 1, 3, 4.

IDC3306I ** PS PROCESSING INVALID FOR KEYED DATA SET

Explanation: Physical sequential access is not possible for the data set. ISAM data sets may not be processed other than sequentially by key.

System Action: Processing of the command is terminated.

Programmer Response: Change the JCL statement to specify a VSAM data set, or correct the usage of the data set.

Problem Determination: Table I, items 1, 3, 4.

IDC3307I ** DATA SET CANNOT BE OPENED FOR KEYED PROCESSING

Explanation: Only indexed VSAM and ISAM data sets can be opened for keyed processing.

System Action: Processing of the command is terminated.

Programmer Response: Change the JCL statement to specify a keyed data set or correct the usage of the data set in the command and rerun the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3308I ** DUPLICATE RECORD XXXXXXXXXX

Explanation: The output data set of a REPRO command already contains a record with the same key. XXXXXXXXXX are the first five bytes in hexadecimal format of the key of the duplicately keyed record.

System Action: The record is not written, and processing continues.

Programmer Response: None.

Problem Determination: Table I, items 1, 3, 4.

IDC3309I ** RECORD xxxxxxxxxx NOT WRITTEN. LENGTH INVALID.

Explanation: 1. Record length was greater than LRECL of output data set (logical processing). 2. Record length was less than LRECL of output data set and output RECFM=FIXED. 3. Control interval length to be written did not equal control interval size for output data set.

System Action: Processing continues until four such errors occur, in which case no more records are written to the data set.

Programmer Response: Redefine the output data set with the correct LRECL or control interval size.

Problem Determination: Table I, items 1, 3, 4.

IDC3310I ** KEY SUPPLIED IS LONGER THAN KEY LENGTH OF DATA SET

Explanation: The key supplied for positioning was longer than the key length of the data set. For example, the key specified by **FROMKEY** is longer than the key length of the data set.

System Action: Processing of the command is terminated.

Programmer Response: Specify the correct key on the command and rerun the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3311I ** TYPE OF POSITIONING NOT SUPPORTED

Explanation: Positioning is valid only for VSAM and ISAM data sets.

System Action: Processing of the command is terminated.

Programmer Response: Respecify the JCL statement defining a VSAM or ISAM data set or remove the positioning parameter and rerun the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3312I ** SYSTEM UNABLE TO OPEN

Explanation: DCBOFLG was not set after an OPEN request.

System Action: Command is terminated.

Programmer Response: Check *VS Data Management Macro Instructions* for possible explanation as to why the DCBOFLG DCB for nonVSAM data set was not set after an OPEN request.

Problem Determination: Table I, items 1, 3, 4.

IDC3313I SYNAD MESSAGE FROM SYSTEM

Explanation: An I/O error occurred for a nonVSAM data set. The SYNADAF message is written. (See *Data Management Services*).

System Action: The command is terminated.

Programmer Response: Check the explanation in the SYNADAF message, correct the error, and resubmit the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3314I RECORD XXXXXXXXX OUT OF SEQUENCE

Explanation: The record to be written contains a lower key than the last record in the data set. *XXXXXXXX* is the first five bytes in hexadecimal format of the key of the record that was out of sequence.

System Action: The record is not written, and processing continues with the next record.

Programmer Response: The record can be written to the data set using skip sequential processing. Rerun the job and the output data set will be opened for skip sequential processing (because data already exists in the data set) and records that were out of sequence will be written.

Problem Determination: Table I, items 1, 3, 4.

IDC3316I ** DATA SET IS NOT VSAM CATALOG

Explanation: A request is for a VSAM catalog to be opened and the data set is not a VSAM catalog.

System Action: The command is terminated.

Programmer Response: Correct the catalog keyword to specify a user catalog and rerun the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3321I ** OPEN/CLOSE ABEND EXIT TAKEN

Explanation: OPEN/CLOSE SVC routines detected an error, and an ABEND message has been written to the JOBJCL data set.

System Action: The command is terminated.

Programmer Response: Check the WTP message written by the OPEN/CLOSE routine, correct the error, and resubmit the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3322I DATA SET ORGANIZATION IS NOT VSAM

Explanation: Request for an existing data set indicated the data set was VSAM. The data set was in fact not VSAM.

System Action: The command is terminated.

Programmer Response: Correct the data set name or type and rerun the job.

Problem Determination: Table I, items 1, 3, 4, 25a.

IDC3350I SYNAD MESSAGE FROM VSAM

Explanation: An I/O error occurred for a VSAM data set. The format and explanations of VSAM I/O errors is provided in *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*.

System Action: Processing continues if possible.

Programmer Response: Check the explanation of the error, correct, and resubmit the job.

Problem Determination: Table I, items 1, 3, 4.

IDC3351I ** VSAM I/O RETURN CODE IS nnn

Explanation: An I/O error was encountered in the VSAM access method. The Virtual Storage Access Method (VSAM) return codes can be found in the *OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide*, GC26-3818.

System Action: This depends on the function being executed. See the message in the program listing following this message.

Programmer Response: Correct the cause of the I/O error.

Problem Determination: Table I, items 1, 3, 4.

IDC35001 A VALID

Explanation: User error. The object name is not specified or not

System Action: The command is terminated.

Programmer Response: See *OS/VS Access Method Services* for the valid specification.

Problem Determination: Table I, items 3, 4.

IDC35011 MODEL AND TYPE IS NOT CONSISTENT WITH THE OBJECT BEING DEFINED

Explanation: User error. The object being used to model a VSAM data set or user catalog differs from that being defined.

System Action: The command is terminated.

Programmer Response: Ensure that the model object type is identical to that being defined.

Problem Determination: Table I, items 3, 4.

IDC35031 FILESEQUENCE LIST IS INCONSISTENT WITH VOLUME LIST

Explanation: User error. The number of elements in the **FILESEQUENCENUMBERS** parameter list is not equal to the volumes in the **VOLUMES** parameter list.

System Action: The command is terminated.

Programmer Response: Check the elements in both lists, and make corrections where needed.

Problem Determination: Table I, items 3, 4.

IDC35041 THE RANGE LIST CANNOT BE CONSTRUCTED

Explanation: Possible system error. In the construction of the **RANGELIST**, the allotted area was not sufficient.

System Action: The command is terminated.

Programmer Response: Rerun the job with the **PARM** option—**PARM TEST** (**FULL((DEFN,1,1))**); contact your system programmer.

Problem Determination: Table I, items 3, 4, 16, 29.

IDC35051 INCORRECT SPECIFICATION OF SPACE ALLOCATION

Explanation: User error. The space parameters **TRACKS**, **CYLINDER**, or **RECORDS** do not appear on the appropriate object parameter list.

System Action: The command is terminated.

Programmer Response: See the **DEFINE** command and space specifications in *OS/VS Access Method Services*.

Problem Determination: Table I, items 3, 4.

IDC3506I A REQUIRED VOLUME LIST HAS BEEN OMITTED

Explanation: User error. The **VOLUMES** parameter does not appear in the command when required.

System Action: The command is terminated.

Programmer Response: A volume list must be available to **DATA** and **INDEX** objects (the **INDEX** object appears only if the data set is **KSDS**). The availability may be through explicit specification of volumes, via propagation of volumes from the Cluster parameter list or from the model object.

Problem Determination: Table I, items 3, 4.

IDC3507I THE RECORDSIZE PARAMETER IS REQUIRED BUT NOT SPECIFIED

Explanation: User error. **RECORDSIZE** must be available to the **DATA** object. The availability may be through explicit specification, via propagation from the cluster parameter list or via the model object.

System Action: The command is terminated.

Programmer Response: The **RECORDSIZE** parameter must be specified when defining **VSAM** space and the allocation unit is records; similarly for any **VSAM** data set whose quantity of allocation is in terms of the **RECORDS** parameter.

Problem Determination: Table I, items 3, 4.

IDC3513I DNAME NOT SPECIFIED WITH UNIQUE ATTRIBUTE

Explanation: User error. The **FILE** parameter must be available to the object which has the **UNIQUE** attribute.

System Action: The command is terminated.

Programmer Response: Specify the **FILE** parameter.

Problem Determination: Table I, items 3, 4.

IDC3514I KEYRANGES ARE INVALID

Explanation: The **KEYRANGES** parameter (**DEFINE** or **IMPORT** command) specified invalid key values for the low or high key values:

- a. the high key value is lower than the low key value in a low-key high-key pair
- b. two or more low-key high-key pairs overlap, or are identical

System Action: The command is terminated.

Programmer Response: Correct the **KEYRANGES** parameter.

Problem Determination: Not applicable.

IDC3515I AVERAGE RECORDSIZE EXCEEDS MAXIMUM RECORDSIZE

Explanation: The first size value of the **RECORDSIZE** parameter is greater than the second.

System Action: Processing of the command terminates.

Programmer Response: Correct either the average or the maximum size value.

Problem Determination: Not applicable.

IDC3516I KEYS PARAMETER REQUIRED FOR KEY SEQUENCED DATA SET

Explanation: The definition of a key-sequenced data set requires the specification of the key position and length, via the **KEYS** parameter of the **DEFINE** command.

System Action: Processing of the command terminates.

Programmer Response: Correct the **KEYS** parameter.

Problem Determination: Not applicable.

IDC3526I ALTERED ALLOCATION STATUS FOR VOLUME nnnnnn IS nnn

Explanation: Informational message. The allocation status of volumes being added or removed from a **VSAM** data set. The code indicating the status is the **VSAM** catalog condition code (see message **IDC3007I**).

Problem Determination: Not applicable.

IDC35271 UNABLE TO LOCATE THE OBJECT TO BE MODIFIED

Explanation: The entry to be modified could not be found in the catalog.

System Action: The command is terminated.

Programmer Response: Verify that the catalog entry exists and the catalog being used is proper.

Problem Determination: Table I, items 1, 3, 4.

IDC35281 THE OBJECT TO BE MODIFIED IS PASSWORD SUPPRESSED

Explanation: The MASTERPW password of the entry or the UPDATEPW or higher level catalog password must be supplied for modifications to be allowed to the entry.

System Action: The command is terminated.

Programmer Response: Verify which password is required and provide the password.

Problem Determination: Not applicable.

IDC35601 UNABLE TO OPEN catalog name

Explanation: Concatenated catalogs are not supported.

System Action: The LISTCAT command terminates with a condition code of 12.

Programmer Response: Ensure that the DD name specified does not concatenate catalogs, unless the desired catalog is the first in the concatenation.

Problem Determination: Table I, items 1, 3, 4.

IDC35901 THE INFILE PARAMETER WAS NOT SPECIFIED FOR EXPORT OF A CLUSTER

Explanation: The INFILE parameter must be specified when exporting a Cluster.

System Action: The command is terminated.

Programmer Response: Add the INFILE (dname[/password]) parameter to the command, which will specify the name of the JCL statement identifying the volumes where the data set to be exported resides.

Problem Determination: Table I, items 3, 4.

IDC35911 THE OUTFILE PARAMETER WAS NOT SPECIFIED FOR EXPORT OF A CLUSTER

Explanation: The OUTFILE parameter must be specified when exporting a cluster.

System Action: The command is terminated.

Programmer Response: Add the OUTFILE parameter to the command that will identify the JCL statement defining the "portability volume".

Problem Determination: Table I, items 3, 4.

IDC35921 THE ENTRYNAME SPECIFIED IN THE ENTRY PARAMETER IS NOT A CLUSTER

Explanation: The object identified by the entry parameter in the command is not a cluster. Only cluster objects can be exported.

System Action: The command is terminated. No export action takes place.

Programmer Response: If a user catalog is to be disconnected, DISCONNECT must be specified in the command. Check to be sure your entry name is really a cluster object name.

Problem Determination: Table I, items 3, 4.

IDC3593I A REQUIRED CATALOG FIELD WAS NOT LOCATED

Explanation: One of the following required catalog fields could not be located by catalog management: ENTYPE, ENTNAME, or NAMEDS.

System Action: The command is terminated. No export action takes place.

Programmer Response: Something is wrong with the catalog entry for this cluster. If this happens, consult your system programmer.

Problem Determination: Table I, items 3, 4, 29.

IDC3600I THE INFILE PARAMETER WAS NOT SPECIFIED FOR IMPORT OF A CLUSTER

Explanation: The **INFILE** parameter was not specified.

System Action: The command is terminated.

Programmer Response: The **INFILE** parameter must be specified in the command to identify the portability data set.

Problem Determination: Table I, items 3, 4.

IDC3601I THE OUTFILE PARAMETER WAS NOT SPECIFIED FOR IMPORT OF A CLUSTER

Explanation: The **OUTFILE** parameter was not specified.

System Action: The command is terminated.

Programmer Response: The **OUTFILE** parameter must be specified in the command to identify the JCL statement which defines the volumes to contain the imported data set.

Problem Determination: Table I, items 3, 4.

IDC3602I IMPORT OF DATA SET FAILED AFTER DEFINE - DELETE ATTEMPTED

Explanation: The cluster being imported was defined successfully, but an error occurred before all the data was copied into the newly defined cluster. An attempt is being made to delete the cluster. There is a message preceding this message in the program listing which will explain why the import failed—invalid DD card, I/O error on portability data set, etc.

System Action: The command is terminated.

Programmer Response: Consult the message preceding this message in the program listing.

Problem Determination: Table I, items 1, 3, 4.

IDC3606I PORTABILITY DATA SET IN ERROR

Explanation: The data on the portability data set is not as was expected; specifically, the record preceding the data records for the cluster is invalid.

System Action: The command is terminated.

Programmer Response: This should not happen. Consult your system programmer.

Problem Determination: Table I, items 1, 3, 4, 26c.

IDC3607I DELETE UNSUCCESSFUL - NOT A TEMPORARY DATA SET

Explanation: The deletion that was to be attempted was not performed. A duplicate name was found in the catalog, and the temporary export flag was not on for the duplicate data set.

System Action: The command is terminated.

Programmer Response: Change the name, or delete the duplicate cluster if you mean to replace it.

Problem Determination: Table I, items 3, 4.

IDC3608I CONNECT FOR USER CATALOG (INSERT) FAILED

Explanation: A message explaining the catalog return code received when attempting to connect the user catalog will follow. This message merely identifies the name of the user catalog which could not be connected.

System

Programmer Response: Change the name of the data set in the program listing.

Problem Determination: Table I, items 3, 4.

IDC3609I VOLUME SPECIFICATION IS NECESSARY FOR IMPORT OF THIS CLUSTER

Explanation: Volume information is passed by EXPORT on the portability data set only if the export was temporary.

System Action: The command is terminated.

Programmer Response: Volumes must be specified in the IMPORT command for at least one object comprising the cluster.

Problem Determination: Table I, items 3, 4.

IDC3610I SPECIFICATION OF DEVICE TYPES, VOLUMES REQUIRED FOR CONNECT

Explanation: When connecting a user catalog, the DEVICETYPES and VOLUMES parameters, as well as the catalog name, are required.

System Action: The command is terminated.

Programmer Response: The user must specify device types and volumes in the command in order to connect a user catalog.

Problem Determination: Table I, items 3, 4.

IDC3612I DELETE UNSUCCESSFUL - NOT A CLUSTER

Explanation: An attempt was made to delete the duplicate entry because catalog define of the data set being imported failed due to the existence of a duplicate name in the catalog. A locate performed on the supposed cluster name revealed that the entry was not a cluster.

System Action: The command is terminated.

Programmer Response: Change the name of the data set you are attempting to import using the NEWNAME parameter. Do a LISTCAT to see what you really have—what you're trying to import has a conflicting name in the catalog.

Problem Determination: Table I, items 3, 4.

IDC3613I ERROR ENCOUNTERED OPENING PORTABILITY DATA SET

Explanation: The portability data set could not be opened.

System Action: The command is terminated.

Programmer Response: No action. The preceding message in the listing explains entry data set not opened.

Problem Determination: Table I, items 1, 3, 4, 26c.

IDC3614I INVALID NAME IN OBJECTS PARAMETER: object name

Explanation: The name specified in the OBJECT parameter in the IMPORT command does not match any of the object names for the VSAM data set being imported.

System Action: The command is terminated.

Programmer Response: Correct the object name.

Problem Determination: Table I, items 3, 4.

IDC3615I DSNNAME ON THE OUTFILE JCL STATEMENT INCORRECT

Explanation: The cluster name of the imported data set does not match the data set name specified in the JCL statement identified by the OUTFILE parameter.

System Action: Processing of the command terminates.

Programmer Response: Correct the data set name specification in the JCL; note that if the NEWNAME parameter is specified, the specified data set name must be that name specified in this parameter.

Problem Determination: Not applicable.

IDC4227I AN 'ELSE' COMMAND APPEARS IMPROPERLY

Explanation: An ELSE modal command appears without a matching IF-THEN modal command. Modal command continuation may be incorrect.

System Action: The remainder of the command input stream is ignored.

Programmer Response: Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC4228I AN 'END' COMMAND IS INVALID

Explanation: An END modal command occurs without a matching DO modal command.

System Action: The remainder of the command input stream is ignored.

Programmer Response: Correct the DO-END usage and rerun.

Problem Determination: Table I, item 4.

IDC4229I 'IF' COMMAND HAS INVALID RELATIONAL EXPRESSION

Explanation: An IF modal command has an invalid relational expression.

System Action: The remainder of the command input stream is ignored.

Programmer Response: Check the syntax and semantic requirements of the IF command. Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC4230I 'SET' COMMAND HAS INVALID ASSIGNMENT EXPRESSION

Explanation: A SET modal command has an invalid assignment expression.

System Action: The remainder of the command input stream is ignored.

Programmer Response: Check the syntax and semantic restrictions on the SET command. Correct the usage and rerun.

Problem Determination: Table I, item 4.



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IDC4232I IMPROPER OR MISSING 'THEN' KEYWORD

Explanation: The THEN portion of the IF modal command is misspelled or missing. Modal command continuation may be incorrect.

System Action: The remainder of the input stream is ignored.

Programmer Response: Correct the usage and rerun.

Problem Determination: Table I, item 4.

IDC4236I INPUT STREAM END-OF-FILE FOUND BEFORE END OF COMMAND

Explanation: Command input stream end-of-file has been found while scanning a command. There may be input records missing.

System Action: The current command is not processed.

Programmer Response: Add the missing data and rerun.

Problem Determination: Table I, item 4.

IDC4237I TOO MANY LEVELS OF 'IF' COMMAND NESTING

Explanation: IF modal commands have been nested to a level that cannot be handled.

System Action: The remainder of the command input stream is ignored.

Programmer Response: Restructure the modal commands to conform to the restriction of ten levels of nesting.

Problem Determination: Table I, item 4.

IDC4999I UABORT CODE *nn*

Explanation: This message indicates a termination error, which caused the processor to abort. The code number (*nn*) indicates the nature of the error. Since the error is usually such that no further processor code may be executed with confidence, this message appears in the output listing by a write-to-programmer action.

20 (Reserved.)

24 No virtual storage available for one of the following:

- Text processor's translate table.
- Initialization of the I/O adapter.
- Automatic (dynamic) storage of a module.
- Text processor dynamic storage.

See the in-virtual storage trace tables to determine which is the correct condition.

32 There was a request to access an unopened data set.

36 The processor was unable to open SYSPRINT (or whichever DD name is employed to denote the processor's standard listing output data set).

40 Invalid U-macro argument list found.

44 The processor is unable to produce a dump.

48 The system adapter's UCALL historical data table is full.

52 Reserved.

56 (Reserved.)

60 VSAM I/O control block manipulation error.

Problem Determination: Table I, items 1, 3, 4, 29.

messages that can follow:

xx IECnnns text {Par}

where:

xx

is the message reply identification (absent if an operator reply is not required).

nnn

is the message serial number, which indicates the data-management functions, as follows: 0nn, end-of-volume; 1nn, open; 2nn, close; 3nn, catalog management; 4nn, checkpoint/restart; 5nn, direct-access device space management (DADSM); 7nn, tape label creation; 8nn, BTAM; and 9nn, problem determination.

s

is a type code, as follows:

A

operator must perform a specific action.

D

operator must choose an alternative.

E

operator must perform a specific action when he has time.

I

no operator action is required.

text

is the message text.

Pnn

is the partition that issued the message.

The data-management messages follow.

IEC113A ENTER PASSWORD FOR DATA SET

Explanation: The requested data set is password protected; you must provide the correct password before you may gain access to the data set.

System Action: None.

Programmer Response: Supply the correct password.

Problem Determination: Not applicable.

IEC115I INVALID PASSWORD

Explanation: The password supplied was incorrect for the requested data set.

System Action: Use of the requested data set is denied.

Programmer Response: Determine what the correct password is and try again.

Problem Determination: Not applicable.

IEC116A REENTER

Explanation: A password was incorrectly entered. Enter the correct password in response to this message.

System Action: None.

Programmer Response: Enter the correct password.

Problem Determination: Not applicable.

IEC250I rrr-ccc,jjj,sss,ddn,ddd,vol,cln,dsn,cat

Explanation: An error occurred during the execution of an OPEN macro instruction for a VSAM data set. The rrr in the message indicates the specific error that occurred; other fields in the message are:

ccc	Function code. See <i>OS/VS Virtual Storage Access Method (VSAM) Logic</i> , which lists each code, its meaning, and the name of the module that detected the error causing the code to be generated.
jjj	Job name.
sss	Step name.
ddn	DDNAME.
ddd	Device address if error is related to a specific device.
vol	Volume serial number if error is related to a specific volume.
cln	Name of cluster that contains the data set being processed when the error was detected.
dsn	Name of data set being processed when error was detected.
cat	Catalog name.

Any missing field is indicated by a comma.

The values of rrr and their meanings are, as follows:

- | | |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | An I/O error was detected while the system was reading the JFCB.
<i>System Action:</i> Processing associated with the OPEN macro is terminated for the data set in error. The ACB error flags in the ACB for the data set are set to 132.
<i>Programmer Response:</i> Rerun the job. |
| 20 | Not enough virtual storage was available for work areas, buffers, or control blocks.
<i>System Action:</i> Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 136.
<i>Programmer Response:</i> Specify a larger REGION parameter and rerun the job. |
| 22 | An I/O error occurred while I/O requests were being completed.
<i>System Action:</i> Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 184.
<i>Programmer Response:</i> Rerun the job specifying a different device for the volume causing the error. |
| 28 | The requested master or user catalog does not exist or is not open.
<i>System Action:</i> Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 180.
<i>Programmer response:</i> Make sure the correct catalog is open by specifying it in your JOBCAT or STEPCAT DD statement, and rerun the job. |
| 32 | The catalog record for the data set being opened was not found.
<i>System Action:</i> Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 148.
<i>Programmer Response:</i> Ensure that the data set entry is contained in the master catalog or a user catalog specified in a JOBCAT or STEPCAT DD statement. You can run the AMS LISTCATALOG function to list the data set entries contained within a specific catalog. |
| 36 | An I/O error was detected while the system was reading or writing a catalog record. |

- Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 144.
- Programmer Response:* Specify a different device for the catalog that caused the problem, and rerun the job.
- 37 An unexpected return code was returned by the catalog routines.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 148.
- Programmer Response:* Rerun the job. If the error persists, restore the catalog and all volumes controlled by it from synchronized restore tapes.
- 40 The data set being opened is security protected, and the Open routine was unable to validate your password.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 152.
- Programmer Response:* Make sure the correct password was supplied in the ACB or by the system or TSO terminal operator. You can use the Access Method Services LISTCAT command to list the passwords for each data set in a catalog. (You will need the master password for the catalog to do this.)
- 41 The buffer space specified is not consistent with the buffer requirements of the data set.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 160.
- Programmer Response:* Make sure the buffer space you specified is large enough to contain the data and index buffers required to process the data set for the specified number of concurrent multiple requests.
- 44 User buffering was specified in the MACRF field of the ACB, but processing other than control-interval was also specified.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 160.
- Programmer Response:* Change the ACB so that only control-interval processing is specified if user buffering is specified.
- 50 The Open routine was unable to fix in real storage the access-method control blocks for the data set being opened.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 176.
- Programmer Response:* Rerun the job.
- 52 The Open routine was unable to get the resource the system requested for the data set being opened. The resource was being used by another task in the system.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 168.
- Programmer Response:* Ensure the availability of the resource by means of your DD statements, and rerun the job.
- 54 The ACB indicated keyed accessing, but the data set is not a key-sequenced data set.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB are set to 160.
- Programmer Response:* Make sure that the type of accessing indicated in the ACB is consistent with the data set being opened.
- 56 The last request to close this data set was not completed successfully.
- System Action:* Processing associated with the OPEN macro is completed for the data set. The error flags in the ACB for the data set are set to 116.
- Programmer Response:* You can ignore the warning and try to process the data set, but the results will be unpredictable. You should use the Access Method

Services VERIFY command to make sure the end-of-file marker in the data-set entry in the catalog is correct.

- 58 The timestamp for the index is less than the timestamp for the data set. This could occur if the data set was updated without the index's being open.
- System Action:* Processing associated with the OPEN macro is completed for the data set. A warning code of 108 is set in the error flags in the ACB for the data set.
- Programmer Response:* You may continue to process the data set, but errors may occur if the data set and index do not correspond.
- 59 The timestamp for the volume does not match the timestamp in the catalog entry for the component. This may mean the component existing on the volume(s) is not accurately described in the catalog.
- System Action:* Processing associated with the OPEN macro is completed for the data set. The error flags in the ACB for the data set are set to 104.
- Programmer Response:* You can continue to process the data set, but the results are unpredictable. To get the timestamps to match, restore the volume from a restore tape that has the same timestamp as the catalog record for the volume. If the problem persists, use synchronized restore tapes to restore the catalog and all volumes specified in the catalog.
- 68 The device type specified in the DD statement is not consistent with the device type indicated in the catalog record for the data set.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 160.
- Programmer Response:* Change the DD statement to indicate the same device type as the catalog record for the data set.
- 72 The data set was empty, but the ACB for the data set did not indicate that it was open for output; that is, the data set was not open to be loaded.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 160.
- Programmer Response:* Change the MACRF parameter in the ACB to indicate output.
- 76 The access-method control block opened was not associated with a valid data set.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set in error are set to 188.
- Programmer Response:* Correct the error and resubmit the job.
- 116 The system detected an I/O error while reading the volume label and format-4 DSCB.
- System Action:* Processing associated with the OPEN macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 164.
- Programmer Response:* Mount the volume on which the error occurred on a different device, and rerun the job. If the problem recurs, restore the catalog and all volumes defined by it from synchronized restore tapes.

Problem Determination: Table I, items 1, 5a, 13, 16, 29.

IEC251I rrr-ccc,jjj,sss,ddn,ddd,vol,cln,dsn,cat

Explanation: An error occurred during the execution of a CLOSE macro instruction for a VSAM data set. The rrr in the message indicates the specific error that occurred; other fields in the message are:

- ccc Function code. See *OS/VS Virtual Storage Access Method (VSAM) Logic*, which lists these codes, their meanings, and the module that detected the error that caused the code to be generated.
- jjj Job name.
- sss Step name.

ddn	DDNAME.
ddd	Device address if error is related to a specific device.
vol	Volume serial number if error is related to a specific volume.
cln	Name of cluster that contains the data set being processed when error was detected.
dsn	Name of data set being processed when error was detected.
cat	Catalog name.

Any missing fields are indicated by a comma.

The values of rrr and their meanings are, as follows:

- | | |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | <p>An I/O error was detected while the system was reading the JFCB.</p> <p><i>System Action:</i> Processing associated with the CLOSE macro instruction is terminated for the data set in error. The error flags in the ACB for the data set are set to 132.</p> <p><i>Programmer Response:</i> You should use the Access Method Services VERIFY command to make sure that the end-of-file marker in the data-set entry in the catalog is correct.</p> |
| 20 | <p>Not enough virtual storage was available for work areas, buffers, or control blocks.</p> <p><i>System Action:</i> Processing associated with the CLOSE macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 136.</p> <p><i>Programmer Response:</i> If the data set was open for output, you should use the Access Method Services VERIFY command to make sure the end-of-file marker in the data-set entry in the catalog is correct, and specify a larger region size. You should do this before trying any further processing on the data set. If the data set was open for input, you need not use the VERIFY command.</p> |
| 22 | <p>An I/O error occurred during I/O processing.</p> <p><i>System Action:</i> Processing associated with the CLOSE macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 184.</p> <p><i>Programmer Response:</i> If the data set was open for output, you should use the Access Method Services VERIFY command to make sure the end-of-file marker in the data-set entry in the catalog is correct. You should do this before trying any further processing on the data set. If the data set was open for input, you need not use the VERIFY command.</p> |
| 32 | <p>The catalog record for the data set being closed was not found.</p> <p><i>System Action:</i> Processing associated with the CLOSE macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 148.</p> <p><i>Programmer Response:</i> Make sure the data-set entry is contained in the master catalog or a user catalog specified in a JOBCAT or STEPCAT DD statement. You can use the Access Method Services LISTCAT command to list the data-set entries contained in a specific catalog. If the data set was open for output, you should use the Access Method Services VERIFY command to make sure the end-of-file marker in the data-set entry in the catalog is correct. You should do this before trying any further processing on the data set. If the data set was open for input, you need not use the VERIFY command.</p> |
| 28 | <p>The requested system or user catalog does not exist or is not open.</p> <p><i>System Action:</i> Processing associated with the CLOSE macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 180.</p> <p><i>Programmer Response:</i> Make sure the correct catalog was not deleted and is open. If the data set was open for output, you should use the Access Method Services VERIFY command to make sure the end-of-file marker in the data-set entry in the catalog is correct. You should do this before trying any further processing on the data set. If the data set was open for input, you need not use the VERIFY command.</p> |
| 36 | <p>An I/O error was detected while the system was reading or writing a catalog record.</p> |

System Action: Processing associated with the CLOSE macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 144.

Programmer Response: If the data set was open for output, you should use the Access Method Services VERIFY command to make sure the end-of-file marker in the data-set entry in the catalog is correct. You should do this before trying any further processing on the data set. If the data set was opened for input, you need not use the VERIFY command.

37 An unexpected return code was returned from the catalog routines.

System Action: Processing associated with the CLOSE macro is terminated for the data set in error. The error flags in the ACB for the data set are set to 148.

Programmer Response: If the data set was open for output processing, use the Access Method Services VERIFY command to ensure that the end-of-file marker is properly addressed in the data set's entry in the catalog; then rerun the job. If the problem persists, restore the catalog and all volumes controlled by it from synchronized restore tapes.

Problem Determination: Table I, items 1, 5a, 13, 26, 29; Table II, Format 4.

IEC252I rrr-ccc,jjj,sss,ddn,ddd,vol,cln,dsn,cat

Explanation: An error occurred during the execution of a CLOSE (TYPE=T operand) macro instruction for a VSAM data set. The rrr in the message indicates the specific error that occurred; other fields in the message are:

ccc	Function code. See <i>OS/VS Virtual Storage Access Method (VSAM) Logic</i> , which contains a list of these codes, their meanings, and the module that detected the error that caused the code to be generated.
jjj	Job name.
sss	Step name.
ddn	Ddname.
ddd	Device address if error is related to a specific device.
vol	Volume serial number if error is related to a specific volume.
cln	Name of cluster that contains the data set being processed when error was detected.
dsn	Name of data set being processed when error was detected.
cat	Catalog name.

Any missing fields are indicated by a comma.

The values of rrr and their meanings are, as follows:

- | | |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | An I/O error was detected while the system was reading the JFCB.

<i>System Action:</i> Processing associated with the CLOSE macro (TYPE=T operand) is terminated for the data set in error. The error flags in the ACB for the data set are set to 132.

<i>Programmer Response:</i> None; message is for information only. |
| 20 | Not enough virtual storage was available for work areas, buffers, or control blocks.

<i>System Action:</i> Processing associated with the CLOSE macro (TYPE=T operand) is terminated for the data set in error. The error flags in the ACB for the data set are set to 136.

<i>Programmer Response:</i> None; message is for information only. |
| 22 | An I/O error occurred during I/O processing.

<i>System Action:</i> Processing associated with the CLOSE macro (TYPE=T operand) is terminated for the data set in error. The error flags in the ACB for the data set are set to 184.

<i>Programmer Response:</i> None; message is for information only. |
| 32 | The catalog record for the data set being opened was not found. |

System Action: Processing associated with the CLOSE macro (TYPE=T operand) is terminated for the data set in error. The error flags in the ACB for the data set are set to 148.

Programmer Response: None; the message is for information only.

28 The requested system or user catalog does not exist or is not open.

System Action: Processing associated with the CLOSE macro (TYPE=T operand) is terminated for the data set in error. The error flags in the ACB for the data set are set to 180.

Programmer Response: None; message is for information only.

36 An I/O error was detected while the system was reading or writing a catalog record.

System Action: Processing associated with the CLOSE macro (TYPE=T operand) is terminated for the data set in error. The error flags in the ACB for the data set are set to 144.

Programmer Response: None; message is for information only.

37 An unexpected return code was returned from the catalog routines.

System Action: Processing associated with the CLOSE macro (TYPE=T operand) is terminated for the data set in error. The error flags in the ACB associated with the data set are set to 148.

Programmer Response: None; message is for information only.

Problem Determination: Table I, items 1, 5a, 13, 16, 29; Table II, Format 4.

IEC253I rrr-ccc,jjj,sss,ddn,ddd,vol,cln,dsn,cat

Explanation: The error occurred during end-of-volume (EOV) processing for a VSAM data set. The rrr in the message indicates the specific error that occurred; other fields in the message are:

ccc	Function code. See <i>OS/VS Virtual Storage Access Method (VSAM) Logic</i> , which lists these codes, their meanings, and the module that detected the error that caused the code to be generated.
jjj	Job name.
sss	Step name.
ddn	DDNAME.
ddd	Device address if error is related to a specific device.
vol	Volume serial number if error is related to a specific volume.
cln	Name of cluster that contains data set being processed when error was detected.
dsn	Name of data set being processed when error was detected.
cat	Catalog name.

Any missing fields are indicated by a comma.

The values of rrr and their meanings are, as follows:

4 An I/O error was detected while the system was reading the JFCB.

System Action: EOV processing is completed.

Programmer Response: None; message is for information only.

20 Not enough virtual storage was available for work areas, buffers, or control blocks.

System Action: EOV processing is terminated for the data set.

Programmer Response: Specify a larger region and rerun the job.

22 An I/O error occurred while I/O requests were being completed.

System Action: End-of-volume processing is terminated for the data set.

- Programmer Response:* Rerun the job specifying a different device for the volume.
- 28 The requested master or user catalog does not exist or is not open.
System Action: EOV processing is terminated for the data set.
Programmer Response: Make sure the correct catalog is open and rerun the job.
- 32 The catalog entry for the data set being processed was not found.
System Action: EOV processing is terminated for the data set.
Programmer Response: Make sure the data-set entry is contained in the master catalog or a user catalog specified in a JOBCAT or STEPCAT DD statement. You can use the Access Method Services LISTCAT command to list the data-set entries in a specific catalog.
- 33 Cannot extend the VSAM catalog. The VSAM catalog has reached the maximum number of extents. Either additional space is unavailable or a system error occurred.
System Action: End-of-volume processing is terminated for the data set.
Programmer Response: The Access Method Services DELETE command can be used to delete entries from the catalog. If no entries can be deleted the Access Method Services EXPORT command can be used to move some of the data sets defined in the full catalog to a portable volume. The IMPORT command can be used to define the exported data sets in a user catalog that has space available.
- 34 The data set has reached the maximum number of extents.
System Action: End-of-volume processing is terminated for the data set.
Programmer Response: Use the Access Method Services REPRO command to make a backup copy of the cluster that contains the data set. Delete the cluster from the catalog with the DELETE command. Use the DEFINE command to redefine the cluster in the catalog with increased space allocation. Reload the backup copy of the cluster with the REPRO command.
- 35 The catalog record for the data set has reached the maximum number of sets of fields allowed. The number of key ranges and volume entries have reached the maximum allowed.
System Action: End-of-volume processing is terminated for the data set.
Programmer Response: Use Access Method Services to: (1) copy the cluster that contains the data set to another volume, (2) delete the cluster, (3) redefine the cluster and either reduce the number of key ranges and volumes or increase the space allocation for each key range to reduce the number of overflow volumes, and (4) reload the copy of the cluster.
- 36 An I/O error was detected while the system was reading or writing a catalog record.
System Action: EOV processing is terminated for the data set.
Programmer Response: Specify a different device for the catalog that caused the problem, and rerun the job.
- 37 An unexpected return code was returned from the catalog routines.
System Action: End-of-volume processing is terminated for the data set.
Programmer Response: Rerun the job. If the error persists, restore the catalog and all volumes controlled by the catalog from synchronized restore tapes.
- 50 End-of-volume was unable to fix the access-method control blocks for the data set being processed in storage.
System Action: End-of-volume processing for the data set in error is terminated.
Programmer Response: Rerun the job.
- 100 No space was available on candidate volumes. You defined the volumes as ordered in the Access Method Services DEFINE command.

System Action: EOV processing is terminated for the data set.

Programmer Response: Delete unneeded data sets from the volumes you specified, or use the Access Method Services ALTER command to provide a different list of volumes for space allocation.

104 No more volumes are available to allocate space on.

System Action: EOV processing is terminated for the data set.

Programmer Response: Use the Access Method Services ALTER command to provide additional volumes for the data set.

108 The EOV routine was unable to get the volume you specified mounted.

System Action: EOV processing is terminated for the data set.

Programmer Response: Make sure at least one of the units allocated for your program is flagged as nonsharable so the volume can be demounted. You can do this by specifying DEFER or more volume serial numbers than units on the DD statement.

112 The EOV routine was unable to get the volume you needed for space allocation.

System Action: EOV processing is terminated for the data set.

Programmer Response: Make sure at least one of the units allocated for your program is flagged as nonsharable so the volume on it can be demounted. This may be accomplished by specifying DEFER or by specifying more volume serial numbers than units available for allocation on the DD statement.

116 The system detected an I/O error while reading the volume label or format-4 DSCB.

System Action: EOV processing is terminated for the data set.

Programmer Response: Mount the volume on which the error occurred on a different device, and rerun the job.

120 Attempt to mount a volume was unsuccessful; failure occurred while resetting control blocks after an error was detected during end-of-volume processing.

System Action: End-of-volume processing is terminated for the data set.

Programmer Response: Examine the previous error messages issued by end-of-volume for this job. Fix the indicated errors and rerun the job.

Problem Determination: Table I, items 1, 5a, 13, 16, 29; Table II, Format 4.

IEC331I *ccc-000,jjj,sss,ffff*

Explanation: An error condition was detected while processing a catalog-management request directed to a VSAM catalog. The value, *ccc*, is the VSAM catalog-management error code associated with the error condition. See message IDC3007I for an explanation of the possible error codes. Other fields in the message are:

jjj Job name

sss Step name

ffff Name of the VSAM catalog-management function that detected the error condition

System Action: See the system action associated with the value printed for *ccc* for message IDC3007I.

Programmer Response: See the programmer response associated with the value printed for *ccc* for message IDC3007I.

Problem Determination: Table I, items 1, 4.

IEC332I ffff\ffff...

Explanation: This message lists the nest of VSAM catalog-management functions that existed when control was passed to the VSAM catalog-management routine that caused message IEC331I to be issued.

System Action: See message IDC3007I.

Programmer Response: See message IDC3007I.

Problem Determination: Table I, items 1, 4.

IEC333I eee,xx,ddd,iii

Explanation: An I/O error condition was detected while processing a catalog-management request that was directed to a VSAM catalog. The error was associated with a VSAM master or user catalog. This message follows messages IEC331I and IEC332I. The fields in the message have the following meaning:

<i>t</i>	L—Logical error (associated with a VSAM record-management return code of 8) P—Physical error (associated with a VSAM record-management return code of 12)	
<i>eee</i>	The VSAM record-management error code. See "How to Code a Program to Process Data" in <i>OS/VS Virtual Storage Access Method (VSAM) Programmer's Guide</i> , GC26-3818, for an explanation of these codes.	
<i>xx</i>	A control byte that indicates the type of I/O that resulted in the error. The values of <i>xx</i> and their meanings are:	
	00 or 20	Addressed PUT
	19, 1B, 38, 3A, or 3C	Keyed PUT
	72	Keyed ERASE
	80, 88, A0, or A8	Addressed GET
	B2 or BA	Keyed GET
	BB	Keyed GET (GET greater or equal)
<i>ddd</i>	Identifies the VSAM catalog to which the I/O that resulted in the error was directed. The value of <i>ddd</i> is either MCT, which indicates the VSAM master catalog, or the address of the device that was allocated to the volume containing the VSAM user catalog.	
<i>iii</i>	Identifies the VSAM catalog logical record that was being processed when the error occurred. The value of <i>iii</i> is either the key of the record, in EBCDIC, or 'C1=cccccc', where ccccc is the relative control-interval number of the record, in hexadecimal.	

System Action: The request is terminated.

Programmer Response: Notify an IBM Programming Support Representative. It may be necessary to restore the VSAM catalog.

Problem Determination: Table I, items 1, 2, 4, 29, 31.

Job Scheduler Messages (IEF)

The job-scheduler messages are listed for the programmer in the SYSOUT data set and for the operator at the operator's console. These messages have the following format:

IEFn timer | text (in SYSOUT)

xxIEFn timer text[Pnn] (at operator's console)

where:

nnn

is the message serial number.

text

is the message text.

xx

is the message reply identification (absent if operator reply is not required).

s

is the type code, as follows:

A

operator must perform a specific action.

D

operator must choose an alternative.

E

operator must perform a specific action when he has time.

I

no operator action is required.

W

processing stopped until action is determined and performed.

Pnn

number of the partition that issued the message.

The job-scheduler messages follow.

IEF447I AMP KEYWORD *nnnnnnnn* IS INVALID STEP WAS NOT EXECUTED

Explanation: An invalid keyword *nnnnnnnn* was specified on the AMP JCL parameter.

System Action: The job was terminated. The remaining job control statements for the job were scanned for syntax errors.

Programmer Response: Probable user error. Specify a valid keyword on the AMP JCL statement. Then resubmit the job.

Problem Determination: Table I, items 1, 2, 7a, 13, 29.

IEF448I AMP KEYWORD *nnnnnnnn* VALUE *xxxxxx* IS TOO LARGE STEP NOT EXECUTED

Explanation: The value *xxxxxx* specified for the AMP keyword *nnnnnnnn* was larger than the maximum value allowed.

System Action: The job was terminated. The remaining job control statements for the job were scanned for syntax errors.

Programmer Response: Probable user error. Specify a value that is less than or equal to the maximum value allowed. Then resubmit the job.

Problem Determination: Table I, items 1, 2, 7a, 13, 29.

IEF449I AMP KEYWORD *nnnnnnnn* REQUIRES A DECIMAL VALUE STEP NOT EXECUTED

Explanation: The value specified for the AMP keyword *nnnnnnnn* was not a decimal value.

System Action: The job was terminated. The remaining job control statements for the job were scanned for syntax errors.

Programmer Response: Probable user error. Specify a decimal value for the AMP keyword *nnnnnnnn*. Then resubmit the job.

Problem Determination: Table I, items 1, 2, 7a, 13, 29.

Checkpoint/Restart Messages (IHJ)

The checkpoint/restart messages are written to the operator's console. These messages have the following format:

xx IHJnnns text

where:

xx

is the message reply identification (absent if an operator reply is not required).

nnn

is the message serial number.

s

is the type code. If the type code is A, the operator is required to perform a specific action. If the type code is I, no operator action is required.

text

is the message text.

The checkpoint/restart messages follow.

IHJ0001 CHKPT *jjj* (*ddn*) NOT TAKEN (*xx*)

Explanation: During execution of a CHKPT macro instruction, an error occurred before the checkpoint routine wrote any part of a checkpoint entry. In the message text, *jjj* is the jobname, *ddn* is the data-definition name of a checkpoint data set (which is omitted if *xx* is 01), and *xx* explains why the checkpoint entry was not written. The values for *xx* added by VSAM's use of IHJ0001 are:

- | | |
|----|---------------------------------------------------------------------------------------|
| 40 | I/O error occurred during a VSAM I/O request. (Return code—0C.) |
| 41 | VSAM data set open for create mode processing; this is not allowed. (Return code—08.) |

IHJ0007I RESTART NOT SUCCESSFUL FOR *jjj* (*xx*{*cuu*})

Explanation: During execution of a checkpoint restart for job *jjj*, an error occurred. In the message text, *xxx* indicates why the restart was not successful, and, in the event of a tape I/O error, *cuu* indicates the unit address. The values for *xx* added by VSAM's use of IHJ0007I are:

- | | |
|-----|---------------------------------------------------------------------------------------------------------------|
| 104 | Warning message; timestamps in the catalog entry for the volume and format-4 DSCB do not match. |
| 108 | Warning message; timestamps on data AMDSB (access-method data statistics block) and index AMDSB do not match. |
| 128 | DDNAME for VSAM data set was not found in TIOT. |
| 132 | I/O error detected while system was reading or writing JFCB for a VSAM data set. |
| 136 | Storage requested by Open or Close routine was not available. |
| 144 | I/O error detected while system was reading or writing a catalog entry for VSAM. |
| 148 | VSAM catalog entry was not found. |
| 152 | Invalid password for a VSAM data set. |
| 160 | Parameters specified for a VSAM ACB conflict with previously specified parameters. |
| 168 | VSAM data set was not available for use. |
| 176 | Attempt to fix pages in real storage failed. |
| 180 | VSAM catalog does not exist or was not open. |

- 184 I/O error completing an I/O request. If *xx* is 136, 168, 176, or 184, resubmit the job.
- 196 The catalog for one or more VSAM data sets in the checkpoint data set has been updated, indicating that another job successfully processed the data set after the checkpoint was taken. Restart cannot restore the data set to its checkpoint status.

Programmer Response: If *xx* is 20, specify a larger region and rerun the job.

If *xx* is 148, make sure the data-set entry is contained in the master catalog or a user catalog specified in a JOBCAT or STEPCAT DD statement. You can use the Access Method Services LISTCAT command to list the data-set entries contained in a specific catalog.

If *xx* is 132 or 144, specify a different device for the catalog causing the problem and rerun the job.

If *xx* is 152, make sure the correct password was supplied in the ACB macro or by the system or TSO terminal operator. You can use the Access Method Services LISTCAT command to list the passwords for each data set in a catalog. (You will need the master password for the catalog to do this.)

If *xx* is 116, you can ignore the warning and try to process the data set, but results are unpredictable. You should use the Access Method Services VERIFY command to make sure the end-of-file marker in the data-set entry in the catalog is correct.

If *xx* is 108, you can continue to process the data set, but errors may occur if the data set and index do not correspond.

If *xx* is 104, you can continue to process the data set, but results are unpredictable. To get the timestamps to match, restore the volume from a restore tape that has the same timestamp as the catalog entry for the volume. If the problem persists, use restore tapes to restore the catalog and all volumes specified in the catalog.

If *xx* is 128, supply a ddname and rerun the job.

If *xx* is 160, correct the ACB parameters in error, and rerun the job.

If *xx* is 180, make sure the correct catalog is open, and rerun the job.

If *xx* is 196, you can override the condition, and allow restart by coding AMP=CROPS=NCK in the DD statement for the data set. Be aware, however, that changes might have been made to the data between the time the checkpoint was taken and when restart is attempted.

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Table I

If the problem recurs, follow the problem determination aids specified by the associated message or code before calling IBM for support:

1. Make sure that MSGLEVEL=(1,1) was specified in the JOB statement.
2. Save the console sheet from the primary console. In systems with Multiple Console Support (MCS), save a copy of the hard copy log.
3. Save the job stream associated with the job.
4. Save the system output (SYSOUT) associated with the job.
5. Make sure that the failing job step includes a
 - a. SYSABEND DD statement
 - b. SYSUDUMP DD statement
 - c. PL1DUMP DD statement
6. Make sure that the PARM parameter of the EXEC statement specifies
 - a. MAP
 - b. LIST
 - c. DIAG
 - d. MSG=AP
 - e. CORE, if applicable
 - f. XREF
 - g. DUMP
7. Execute the LISTIDR function of the HMBLIST service aid program to obtain a list of all members with a PTF or local fix, and save the output. Execute the program against the
 - a. SYS1.LINKLIB data set
 - b. SYS1.SVCLIB data set
 - c. library containing the program that issued the message
8. Execute the IMCJOBQD service aid program to obtain a formatted copy of the contents of the SYS1.SYSJOBQE data set.
9. Execute the HMDLIST service aid program to obtain
 - a. an object module listing, specifying the LISTOBJ function
 - b. a load module map and cross-reference listing, specifying the OUTPUT=BOTH option of the LISTLOAD function.
10. Have a copy of the Message Control Program (MCP) available.
11. Execute the HMDSADMP service aid program to dump the contents of real storage and page data sets on magnetic tape.

After restarting the system, execute the GO function of the HMDPRDMP service aid program to print the real storage portion of the dump tape produced by HMDSADMP.

Save both the tape from HMDSADMP (should further information from the tape be required) and the listing from HMDPRDMP.

Save the resulting dump output.
12. Execute the SEREP program, and save the resulting output.
13. Save all the associated output.
14. In the normal response to this message, the programmer/operator was requested to execute a specific program. Save all output from that program.
15. Save the program listing associated with the job.
16. Save the dump.
17. Have the system generation (SYSGEN) output available from
 - a. Stage 1
 - b. Stage 2
18. Execute the IFCEREPO service aid program, specifying PARM=(N), to dump the SYS1.LOGREC data set. Save the resulting output.
19. Save the assembly listing associated with the job.
20. Save the control cards associated with the job.
21. Save the compiler output associated with the job.
22. Save the source input associated with the job.
23. Save the source program listing associated with the job.
24. Run OLTEP diagnostics for the problem device and save the output.
25. Execute the IEHLIST system utility program to obtain a list of the
 - a. volume table of contents of the associated volume, specifying the FORMAT option.
 - b. volume table of contents of the associated volume, specifying the dump option.
 - c. directory of the associated data set.
 - d. the system catalog.
26. Execute the IEBTPCH data set utility to
 - a. print the directory of the applicable data set.
 - b. print the applicable data set.
 - c. print the applicable member.
 - d. print the applicable procedure.
27. Have the linkage editor/loader map available.
28. Save the associated volume.
29. Contact IBM for programming support.
30. Contact IBM for hardware support.
31. Use the Access Method Services PRINT command, DUMP format, to print the VSAM catalog.

Table II

GTF for problem determination:

Format 1: Tracing without prompting for event keywords.

Before reproducing the problem, have the system operator issue a START GTF command specifying tape output, MODE=EXT and TIME=YES. In response to message HHL100A, he should type TRACE=opt, where opt is the trace option keyword indicated for the particular message or code, within the text of his reply.

When data for the problem has been recorded, run the HMDPRDMP service aid program using the EDIT statement to format the trace output, specifying DDNAME=(ddname of the trace data set).

Format 2: Tracing with prompting for event keywords.

Before reproducing the problem, have the system operator issue a START GTF command specifying tape output, MODE=EXT and TIME=YES. In response to the message HHL100A, he should specify the trace option keywords indicated for the associated message or code within the text of his reply. Then, in response to the message HHL101A, he should specify the event keywords also indicated with the associated message or code.

When data for the problem has been recorded, run the HMDPRDMP service aid program using the EDIT statement to format the trace output, specifying DDNAME=(ddname of the trace data set).

Format 3: Specialized tracing action.

Before reproducing the problem, have the system operator issue a START GTF command specifying tape output, MODE=EXT, and TIME=YES. In response to message HHL100A, he should type 'TRACE=SYS,USR'. The DD statement for a data set in error should specify DCB=DIAGNS='TRACE'.

When data for the problem has been recorded, execute the EDIT function of HMDPRDMP specifying the options SYS and USR=FFF.

Format 4: Specialized tracing action for VSAM.

Before reproducing the problem, have the system operator issue a START GTF command specifying tape output, MODE=EXT, and TIME=YES. In response to message HHL100A, he should type 'TRACE=SYS,USR'. The DD statement for a data set in error should specify AMP='TRACE'.

When data for the problem has been recorded, execute the EDIT function of HMDPRDMP specifying the options SYS and USR=(FFF,FF5).





International Business Machines Corporation
Data Processing Division
1133 Westchester Avenue, White Plains, New York 10604
(U.S.A. only)

IBM World Trade Corporation
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(International)